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LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

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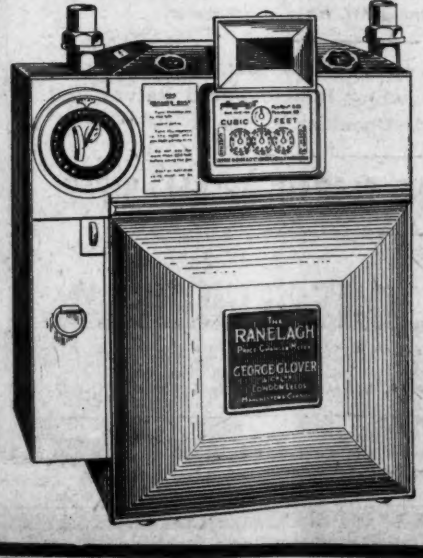

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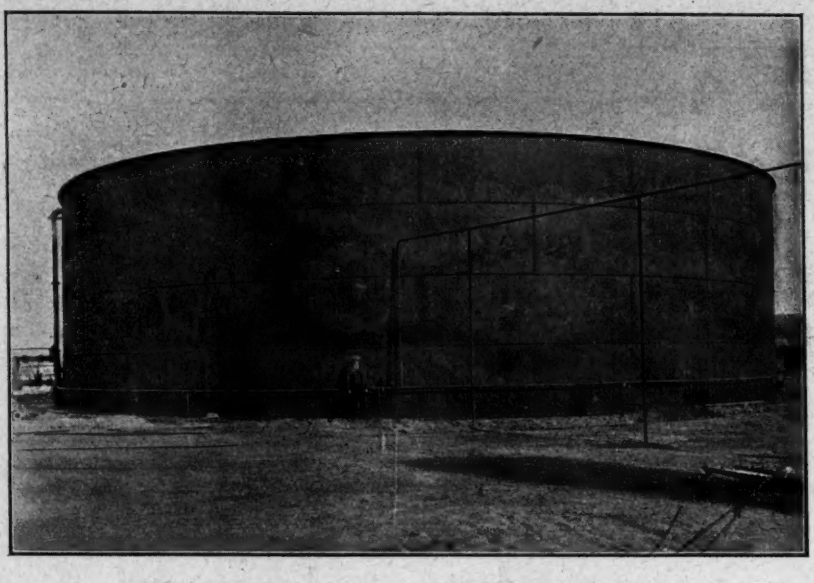

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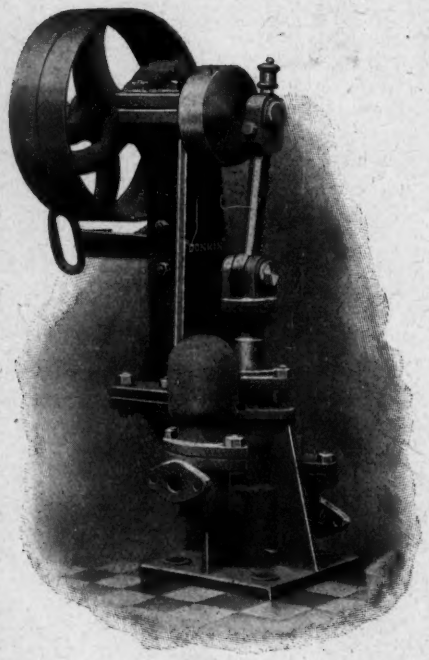

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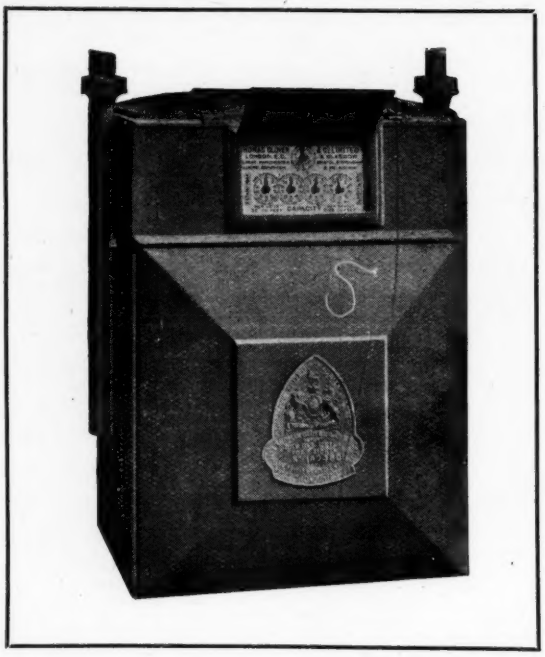

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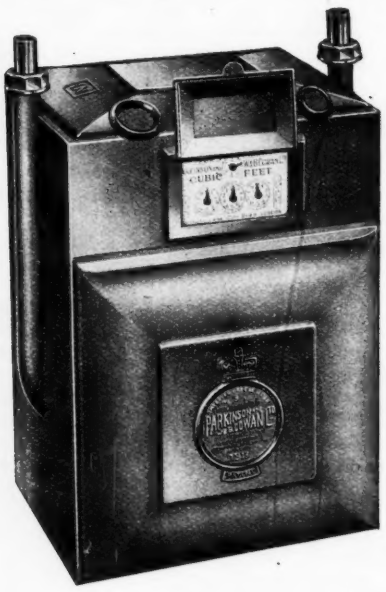

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VOL. CLX., No. 3099.] WEDNESDAY, OCTOBER 4, 1922. [74TH YEAR.

EDITORIAL NOTES.

The Provan of To-Day

THE Provan Gas-Works of the Glasgow Corporation to-day exemplify much to the gas engineering mind. They illustrate the vast expansion that has been made in gas supply, and consequently in productive needs. They illustrate, too, the tremendous strides that gas-engineering has made in all directions; and they demonstrate the transformation which has been effected in ideas and knowledge on the technical side of the industry during the past twenty years. Magnitude, of course, is always impressive; but many engineers point to magnitude in plant as being but a repetition and assembling of small units. What, however, is seen to-day at Provan is something more than that. It attests technical and commercial advance of the first order. Of this one is always the more impressed when opportunities allow of judgment by contrast. Movements in gas development are of a comparatively steady order, and do not attract so much as the material aggregation that is to be found in a new section of works such as that at Provan. In 1900, we were taken by the late Mr. William Foulis over the rough surfaced site, differing greatly in its levels, and had explained to us, with all the enthusiasm of that versatile engineering mind, the plans he had formed, and how he was going to make the higher and the lower levels serve in the maturing of his scheme, and in economical operation. The consummation of the first section (which we had the good fortune to inspect on completion) has been a monument to his brilliant engineering skill; and, at this point, with Mr. William Foulis we should like to associate his immediate successor, Mr. Alexander Wilson. It is but little more than twenty years ago that the first foundations were put in at Provan. Now, with Mr. John W. M'Lusky as Engineer and General Manager of the Department (whom we heartily congratulate on the completion of a magnificent engineering scheme), the second section of the works has been completed; and a comparison of section 1 and section 2 shows little of parallel feature. Whether Mr. Foulis, had he still been in office to-day, would have adopted the scheme which we see before us in section 2, in view of what he did in section 1, is a matter we cannot even psychically ascertain; but we believe he would have done so, or something approximating to it, because, even in the small things appertaining to the industry's work, he was first and foremost a progressive. In his scheme, horizontal retorts were adopted, operated by the Arrol-Foulis stoking machinery; to-day, in the second section, carbonizing operations are continuous in vertical retorts, with charging and discharging proceeding by the natural force of gravity, and boilers, by the utilization of waste heat, economically supplying more than sufficient steam for the operation of the whole plant. Whatever were Mr. Foulis's views twenty years ago, his progressive mind would have kept pace with the times, and his engineering actions would have been moulded by the progress of knowledge and achievement, which have such material effect upon the destiny of an industry.

The chief feature of the new section is, of course, the enormous installation of Woodall-Duckham continuous vertical retorts, numbering 192, and disposed in eight benches of 24 retorts, each retort having a carbonizing capacity of about 7 tons per day. We believe this is the largest single contract ever given out for continuous vertical retorts, though there are works to-day with a larger number of verticals upon them. The contract included all the auxiliary plant for coal handling, breaking, elevating, and storing, and the transfer from the retorts of the resulting secondary products. The carbonizing plant will deal with 1356 tons of coal per twenty-four hours; and the yield of gas per retort is from 88,000 to 100,000 c.ft., subject to the quality of the coal and the thermal value of the gas. The total producing capacity therefore varies between approximately 17 million and 19¼ million c.ft. per twenty-four hours, to be added to the 12 millions of the first section. Each section of plant has been made as completely self-contained as possible; but the service of the auxiliary plant has been so arranged as to be interchangeable to meet any contingency due to mishap of any kind. The general features of the plant are presented in the description published later in this issue of the "JOURNAL"—the letterpress supplying much general information; the illustrations conveying to the eye a great deal that the letterpress does not and cannot do. We are greatly indebted to Mr. M'Lusky for the facilities afforded to enable us to publish this interesting account of the new section with our report of the proceedings at its inauguration last Thursday.

The auxiliary plant to deal with this considerable production of gas is of a large and varied order. One is attracted by the extent to which reinforced concrete work has entered into the membership of this extensive scheme. It is found in the construction of hoppers, purifiers, and other parts. Another notable feature is the length of the gravity bucket conveyors—860 ft. long, each being capable of supplying a section of two benches with coal at the rate of 80 tons an hour. These coal-conveyors are electrically operated; and the conveyor in each section is so wired that it is impossible to start the coal-breaker till the coal-conveyor is running, thus preventing the coal-breaker from being choked. Due to the great length of each conveyor chain, it has been advisable to instal stop push-buttons at intervals, so that in an emergency the breaker and the conveyor can be stopped instantaneously from seven different points. Attention is also arrested by the variety of meters found on the works. In the exhauster-house is a rotary meter which indicates to the attendant the volume of gas passing, and enables him to regulate the exhausters and adjust the volumetric governors to pass the correct volume of gas to each section of the scrubbing plant. In the meter-house one finds the old-type meter registering by a revolving drum. There is also the "Thomas" meter, which measures by the quantity of electric current required to heat the gas by a definite amount. Then there is the "Dominion" meter, which measures electrically by a reduction of pressure on the underside of a diaphragm placed in the main; and there is also a Venturi tube meter. Some valuable experience with these various meters should be collected by Mr. M'Lusky, which would be of considerable use to the gas profession. Electricity is freely applied as the power agent about the station, which is a customer of the Corporation Electricity Department. The fact that such a large new section of works at Provan has been necessitated by the growth of business and the outlook for further expansion, should be sufficient assurance to the Electricity Department that gas is in neither a moribund nor a somnolent condition. Anyway it will probably find that Provan will make a very good customer for electrical energy for operating plant engaged in the manufacture of the gas that the public want. When the plant is in full operation, the consumption of electrical energy, it is computed, will be about 2 million units per annum—a customer of no mean order.

A great piece of engineering work has been successfully completed in this second section at Provan; and the congratulations upon it already offered to the responsible

Engineer (Mr. M'Lusky) we would extend to the contractors and sub-contractors and all the members of their staffs, as well as to those of the engineering staff of the Gas Department who have taken part in it. The new works, too, are a testimony to the enterprise of the Gas Committee and of the City Council who endorsed the plans and authorized an expenditure totalling to a considerable amount, but withal an expenditure necessary and urgent in the public interests. There will be many gas engineers who will desire to make a pilgrimage to Provan to see this large accomplishment in modern gas engineering.

What is the "Best" Quality?

AN additional general meeting of the Southern District Association of Gas Engineers and Managers was held last Thursday at Exeter, under the presidency of Mr. J. M. Campbell, of Margate. No one who was present regretted the opportunity of having this extra meeting. It was altogether highly successful. The principal item on the *agenda* was an attractive one in the realm of current gas policy; and the views of gas engineers upon it being so divergent, there could not fail to be a good discussion. The subject was the best quality of gas to declare under the Gas Regulation Act, having regard to the interests of the supplier and the user. Of course, there is no universally "best" quality. There is a "best" quality for each undertaking, and that quality is governed by several factors, which may vary greatly as between one undertaking and another, and may change with time in every undertaking. It is a genuinely good thing for the gas industry that its professional men are disposed to show a large independence in this matter of the calorific power to be declared, as this enables a great research to be made into the question under actual working conditions of production, distribution, and use, and in circumstances that are vastly dissimilar. From the variety of experiences we shall learn much more than would be the case by stereotyping one declared value all over the country. This would be absolutely contrary to the spirit and basic intention of the Gas Regulation Act, which presents the opportunity to each gas undertaking to work along the soundest lines of economic advantage, "having "regard to the interests of both supplier and user," which interests are, of course, mutual. It is no use, in the circumstances, attempting to generalize over the "best" calorific value. What is really needed is to bring well into focus those guiding considerations which help to make individual determinations, and which do not appear to have reached a well-defined form in all minds. However, we cannot this week examine with the fulness that it deserves the discussion that took place at Exeter last week. The opening was in the capable hands of Mr. G. M. Gill, whose contribution bristled with points over which there could be much controversy. He is an advocate, where straight coal gas is supplied, of a declaration in the neighbourhood of 560 B.Th.U.; while Mr. A. W. Sumner's experience (so he firmly believes) justifies a preference for a gas of 400 B.Th.U. There were good points in both contributions, as well as in the various speakers' remarks; but to-day we will leave the matter with this note, which will suffice to turn the attention of readers to the discussion. We will only say this one thing more—that Mr. Gill did not appear to have a large following for 560 B.Th.U. gas; and the discussion left the decision as open as ever as to the best quality of gas to declare. There is no one best quality. There are best qualities, as we have said, varying with places and conditions.

Annual Meeting of the "B.C.G.A."

GLANCING down the programme prepared for the annual meeting (from Oct. 16 to 18) of the British Commercial Gas Association, we are convinced there will be, on the part of those who are unable to be present, legitimate cause for envy of those who will be there. In it is much promise of interest, instruction, and of a harvest of experience. There is also sound evidence that the members will have with them the best wishes of the civic authorities, and that the Bristol Gas Company will, as hosts, do their generous part in making the visit attractive and pleasant. The Lord Mayor (Alderman E. H. Cook, D.Sc.) will welcome the visitors; and in this he will be aided by the Chairman of the Gas Company (Mr. J. H. Howell). The President of the Association is Alderman Sir George E. Davies, who is the Deputy-Chairman of the Gas Company. In the positions of these prominent citizens and the parts they will take, the civic life and industry of the city will be united in welcoming an Association whose aims and objects are not only commercial but educational. Gas is a popular utility; and a community such as that at Bristol has no more desire to do without it to-day than it has to discard other necessaries. The same may be said of electricity. And sensible are those men who (though electricity may be a municipal enterprise and gas a company one) can look on them both as essentials in and to the life of a community—both promoting health, convenience, and labour-saving. Bristol will, during the proceedings, hear much about these things from the Presidential Address, the lectures, and the papers. The items of the programme indicate that the subjects will spread themselves well over the domestic and the industrial uses of gas; and several of the authors are men of the south-west. In fact, they will predominate. It is right they should, meeting as the Association will be doing in the great, historic city of that part of the country. Two of the chief officials of the Association will be contributing to the proceedings; and the Executive Chairman (Mr. F. W. Goodenough) will be submitting an account of the work done during the past year. That work makes a massive bulk when all the parts and operations are brought together, though, regarded separately, they may not appear to the eye as representing anything much. It is not, however, everybody who has the ability, unaided, to look beneath the surface.

Oil Gas Catalytically Produced.

AN opportunity is given to-day of returning to this interesting subject—interesting because it involves a suggested revolution in the methods of producing oil gas for carburetting purposes, and, in addition, gives profitable products from the oil used. It will be remembered [see "JOURNAL" for Aug. 30] that the subject of the catalytic manufacture of oil gas was introduced at the annual meeting of the Société Technique du Gaz by M. Mallet; and the paper appeared to have running through it quite an optimistic vein, as presenting a means for the production of oil gas for enrichment purposes that was a departure from a crude to a scientific method. There is no doubt about the experimental results. They have been obtained and recorded with great care. The questions are as to relative efficiencies, costs, profitableness, and as to whether the results yielded by trial working would materialize with a plant run on a large scale and under ordinary working conditions. One welcomes all such new proposals; but practical men—men who have all the time to work with an eye upon ultimate economy—have to proceed with caution. We find that caution reflected in a short article (with a drawing showing generally the arrangement of the catalytic gas-generating plant) contributed to our columns to-day by M. G. Coune, of the Forest Gas-Works of the Imperial Continental Gas Association There will be recollection of the fact that M. Mallet stated that at those works a trial plant had been running for four months; and he gave results. These are fully confirmed, and more, by the article in other columns to-day.

In the Forest Gas-Works trial plant, six cast-iron retorts were used. The retorts, provided with a catalyzer, were heated by tar-burners, and kept at as constant a temperature as possible—this being essential to obtain satisfactory results. Reference is made in the article to the condensation, washing, and measurement of the products, after which the oil gas is sent into the water-gas mains to be mixed as thoroughly as possible with blue water gas. But the results are, of course, the important thing. From a ton of oil of 19,650 B.Th.U. per lb., M. Mallet showed that with this trial plant 15,070 c.ft. of gas were obtained of a calorific value of 1686 B.Th.U. per cubic foot, 62 gallons of motor spirit, and 410 lbs. of tar. The present article by M. Coune informs us that during the four months' trial 16,881 cubic metres of catalytic gas (596,185 c.ft.) were produced. He also states that the mean calorific value (gross) was about 15,000 calories per cubic metre—that is, 1686 B.Th.U. per cubic foot. The maximum reached was 16,800 calories, and the minimum 14,000 calories, per cubic metre. These figures indicate that the test was a substantial one; and the testimony is given in the article that the process does not involve any real difficulty, and the gas production is as regular as can be. This is highly satisfactory—particularly as the information supplied attests that the guarantees of the makers of the plant were fulfilled. As a matter of

fact, the guarantees were exceeded on days when the consumption of gas necessitated the aid of every available means of production. It is remarked that this goes to prove that the catalytic process allows a large margin for variation in the rate of production. But, of course, there must be some limit, having regard to effective gasification. Condensation has not given trouble—there has, in fact, been none worth mentioning; if there were, it could be avoided by more thorough washing.

The costs of the process are of considerable importance, and have to be considered in relation to the results realized by other methods of oil-gas production. The experimental costs, however, have not been disclosed. M. Mallet stated that 62 gallons of motor spirit could be produced per ton of oil; and our present contributor bears testimony as to the efficiency of this in use. Unrectified, 50 p.ct. of it mixed with ordinary motor spirit has been used with success on one of the motor lorries of the Forest Gas-Works. Of course, in looking at the economy and efficiency of the process, this large production of motor spirit is a cogent argument in favour of the catalytic system. In view of the yield of motor spirit, our contributor goes so far as to describe the oil-gas production as being in the nature of a bye-product, which can be sold at a figure lower than the cost price of rich gas produced in the manufacture of carburetted water gas. The advantages of the catalytic process, as set forth in the article and by M. Mallet in his paper, are worthy of serious consideration; always bearing in mind the view of M. Coune that tests on a larger scale will be necessary to show whether the anticipated economies are realized in actual practice.

The article submits a suggestion for co-operative working, by assembling on one site catalytic plant sufficient for supplying several gas-works with gas for enrichment. There would, of course, be obvious manufacturing advantages and economies in this; but, on the other hand, there would be the cost of transport as a *contra*. One small point appears in the article regarding which we cannot completely agree with our contributor. He says that, properly speaking, the manufacture and sale of motor spirit does not belong to the gas industry. We think that it does. The war proved it, when benzole was so supremely important. And if a development in gas-works processes yields an additional supply of spirit, then it is the duty of the industry, in the interests of its primary commodity, to make the best possible commercial use of it.

Electric Locomotives for Gas-Works.

Gas engineers are notoriously catholic in their ideas. They are engineers first, and partizans afterwards. As engineers, they make use of those things that appeal to them, for a particular use, as being most suitable. Owing to the scattered disposition of their mechanical plant and the operations involved, they have largely adopted electricity for power purposes; but this energy is mostly generated by the employment of a gas-engine. In doing this, they are described as heretical by those electricians who have not the capacity to discriminate between a heretic and an engineer. However, much the same will probably again be said when it is learned from an article on a later page that Mr. A. J. Harrison, the General Manager of the Accrington Gas and Water Board, has given a lead in the adoption of an electric storage-battery locomotive for handling the whole of the material for the Great Harwood Gas-Works—this approximating 60,000 tons a year—from the neighbouring goods yard, and its distribution on the works. At the Great Harwood works, all the gas-manufacturing operations are now concentrated; the Accrington station having been closed down. When these works were in operation, eleven horses were required by the department for works' haulage purposes; now the increasing traffic is handled at the one works by a single electric locomotive, and in less than half the time. One does not require any great vision to see that, compared with the former state, the new order possesses several advantages and economies. The problem of haulage on a gas-works is well worth looking into. It is one of those things in which custom has largely prevailed; and custom is sometimes very wasteful. The electric storage locomotive comes forward as a claimant for consideration, more particularly now that so many gas-works have their own electricity generating plants. But they have also a great deal of suitable fuel for steam locomotives. The former, however, asks that attention should be given to the fact that it has no stand-by fuel charges, requires little labour, and is ever-ready for use. Those are not all the good points submitted for consideration; but they are contributory to low running costs for intermittent work. From this example of the application of an electric locomotive to gas-works operations, figures as to costs are not yet available. It is desired that a full year's working—taking the light with the heavy seasons—shall be passed through; and complete, representative, average figures be obtained. Speaking of labour costs, of course the battery has to be charged. Its capacity per charge is 41 kw.-hours at normal rate; and this can, if necessary, be increased to 55 kw.-hours by boosting at noon for an hour at twice the normal rate. The ordinary charge is equivalent to 500 ton-miles per charge, or 690 ton-miles when there is boosting of the charge. We hope to hear from Mr. Harrison as to running experiences as soon as seasonal limitations and differences give him information that will enable a fair average to be struck. Meanwhile we heartily congratulate him upon his enterprise.

Summer Time Ends.

Summer time will cease, and normal time will be restored, at 3 a.m. on Sunday next, when the clock will be put back to 2 a.m.

The Therm and the Cubic Foot.

There was a very neat and convincing reference to the therm controversy in the speech of Mr. Henry Woodall at the meeting of the British Gas Light Company. The Company, having four stations, have experience of charging both by the therm and by cubic feet. Mr. Woodall's only fear about the therm formerly was that it would cause irritation—not so much on account of its being a new unit of charge, but because it coincided with an increase of price which was necessary to give the holders of gas stock and shares a moderate dividend. There has been the irritation; but nevertheless Mr. Woodall is convinced that the therm has come to stay. Under it the consumer has only to pay for what he receives; and he believes that shortly it will become a familiar and not a distrusted unit of charge. This is the opinion we hold; and in our judgment it would be a great piece of folly to get panic-struck over the newspaper agitation, and to seek a reversion to the old order of things. At Hull the Company still charge by the 1000 c.ft.; and there the largest profits have been made. What do those who attack the therm think of this testimony?

Oil-Stoves and the Therm.

It is stated by one oil-stove authority that the reduction of 2d. in the price of paraffin oil is going to make a considerable difference to the oil-stove trade. The therm system of charging for gas is also said to have influenced inquiries for oil-stoves; and there are now many more of them in use than formerly. Oil-stoves are not labour-saving, and people will not tolerate the messy things for any length of time. However, the oil-stove trade has had a pretty lean time of it; so that we will not envy them any temporary advantage and pleasure they may secure from transient circumstances.

Coke Ignition Temperatures.

Coke is receiving a great deal more attention now than it has ever had before. It is a commodity, experience shows, that requires respectable qualitative features to assure an attractive efficiency resulting in excellent sale. Much consideration has been given to the influence of structural characteristics on its free burning. Several investigators have been experimentally inquiring into this aspect; and it has been found that volatile matter content can be dismissed if other physical properties are right. Dr. Bunte and Herr A. Kölmel have, it is now seen, been conducting a research into the ignition temperatures of coke of various characteristics; and the results are published in later columns to-day. The investigators describe the methods adopted in their tests. The size of the coke used was 3 to 5 mm.; and air was passed at the rate of 15 litres per hour. The ignition temperatures determined were for semi-coke 395° C., for gas coke 505° C., for coke-oven product 640° C., and coke from continuous ovens 530° C. The ignition temperatures were gradually lowered with an increase in the rate of air flow. Size of coke also plays a part in this respect. Gas coke of 0·5 to 1 mm. had an ignition

temperature about 5½ p.ct. lower than coke of 3 to 5 mm. The fact that ignition temperature was found to depend to a large extent upon oxygen concentration and size of coke tends to show that those characteristics are of most influence which are connected with the degree of fineness of division of the substance. It is believed that the method of carbonization, and mainly perhaps the speed, is an important factor. Further research on this subject is promised.

Gas Coal Position.

The reports from all the markets show that gas coal prices are being maintained; the situation from the selling point of view being stronger through seasonal demands. For export, however, the figures in the North are showing an upward tendency. In Yorkshire, the demand is also on the up-grade, particularly for screened gas coal; and larger quantities are being taken by gas-works. Very little of this class is found in the open market; but some good bargains have been made for the second classes of coal. In North Wales, the pits are working from hand to mouth in meeting the larger requirements for gas-making and storage. More activity through the heavier demands is also reported from other districts.

A Fundamental Need.

In the Presidential Address of Mr. W. E. Highfield to the National Society of Supervising Electricians, he said that it was very necessary for the electricity supply industry to be prosperous, so as to secure the prosperity of the rest of the industry. This applies to other industries besides that of electricity supply; but the fact is not always realized. The fundamental need for the prosperity of the whole of the gas industry, which includes the makers of gas plant and appliances, is the continuous increase of the consumption of gas. Without that increase, extensions would not be required—only the replacement of worn-out plant and appliances.

The Petrol Cut.

The cut in the price of petrol by 5½d. has been given widespread welcome; and it is believed that it will have an all-round valuable effect upon traffic costs. The proclaimed causes for the reduction are lower American oil prices and cheaper freights. But some of the big users of petrol are looking upon the move with a certain amount of suspicion. There is a belief current that the authorities see that the shifting of the tax from petrol to horse power was a mistake, and that there will be a return to the old basis of taxation. The impression is that the petrol importers see "the writing on the wall," and want to be prepared for the change. Another factor is pressure from the Press. A further view is that the importers desire to squeeze the life out of the competitors on the market. Some of the large users of motor spirit, however, have expressed their determination to stand by home productions.

Reduced Profits of the Coal Industry.

It is now possible to give definite results of the working of the coal industry for the twelve months from July 1, 1921, when the new agreement regulating wages was put into operation. To appreciate the present actual conditions, however, it is necessary to go back three months further—to the end of March, 1921, when Government control of the industry came to an end. It will be recalled that in the first quarter of 1921, the last three months of control, the industry was worked at a loss amounting, according to the official returns of the Mines Department, to £14,684,936. This was the position when the stoppage began on April 1. The cost of the stoppage to the collieries is given by the Mines Department as £10,413,650, which is probably an under-estimate, since the return did not quite cover the whole industry. It will thus be seen that, when work began under the terms of settlement on July 1, the industry was burdened with a loss, apart from the loss sustained during the control period, of something substantially in excess of £10 millions. To meet this, the colliery companies had to draw largely on their reserves; limitations of banking accommodation adding in many instances acute embarrassment to the situation. For the year ended June, 1922, the trading profits of the industry in Great Britain amounted to £9,084,688. For the period April, 1921, to June, 1922, the industry was worked at a net loss of £1,328,962. This loss should be compared with the profits of the industry for the last complete pre-war year, 1913, which amounted to £28,000,000. Or, if the twelve months July, 1921, to June, 1922, alone are taken, it will be observed that, as against a profit of 2s. a ton in 1913, there was a profit in the first year of the new agreement of 10·1d.

Railway Rates for Coal.

The Mining Association of Great Britain, at the time of the last reduction in railway rates, declared that the railway companies were not considering the matter in the generous manner they should do, having regard to the financial position of the coal industry, the industrial situation of the country generally, and the cost of living. They are now urging the Railway Clearing House to arrange a further meeting to discuss lower rail rates for coal traffic. The Association point to a loss to the coal industry of nearly £2,000,000 in the fifteen months since Government control came to an end, though, as the previous paragraph shows, that only applies by taking the fifteen months, and not the twelve, to June last. However, the industry has done everything within its power to restore itself to an economic basis. The Association are strongly of opinion that present conditions do not warrant a railway charge of more than 50 p.ct. above pre-war rates for coal traffic, and that nothing less than a reduction of rates to this point, *plus* the total abolition of the flat rate, can suffice to help the trade of the country.

Coal Shortage and Export Trade.

There is plenty of British coal for all purposes just at present; but in the editorial columns last week, attention was called to the possible position if or when trade gets back to its normal pre-war state, and coal output is down below pre-war level owing to the operation of the miners' seven-hour day. Every effort is now being made to increase the coal export trade. The financial situation of the country requires it; the position of employment in the coalfields urgently needs it. At the same time, all permanent enlargements of the export trade in coal will, with the return of the activities of the home industries, carry us further along the road to the point where the effects of a coal shortage would be felt. Nevertheless, there will be a great deal of sympathy with the efforts that are being made in Canada to obtain constant supplies from this country. The Canadian authorities appear to want this; and agents from collieries in this country are working over there in the attempt to forge a lasting chain of business in this respect, both for bituminous and anthracite coal. Canada is tired of being brought to the verge of a coal famine through prolonged labour disputes in America; and it is likewise tired of the heavy fluctuations in the price of American coal. The Ottawa authorities have appointed a Fuel Committee, who are making systematic efforts to ensure the Dominion against similar disasters in the future—first, by the development of Canadian coal, oil, peat, and other fuel resources; and, secondly, by the further development and importation of British coal rather than American. It is believed that it would be an easy matter to arrange to secure large shipments of British coal during the summer months, when there is comparatively little demand for Atlantic freights with correspondingly low charges. It is thought that British exporters have a great opportunity here.

Miners' Wages.

The position in this regard is still acute. There is a large amount of idleness and short-time working among the colliers; and many families are in a precarious condition. Improvement in these respects cannot be realized by taking drastic steps, as some of the men seem to think. It can only come about by a natural order of things, and particularly by lower prices for coal enlarging trade generally. Some of the Miners' Associations urge the scrapping of the current agreement. The leaders at headquarters know the futility of this; and their policy is to renew the agreement, while endeavouring to obtain modifications in it.

The Prince of Wales, who is patron of the Ramsay Memorial Fund, has consented to unveil, on Friday, Nov. 3, the memorial tablet of the late Prof. Sir William Ramsay, which is being placed in Westminster Abbey.

ELECTRICITY SUPPLY MEMORANDA.

Are we going to have any serious competition between electric ovens and gas ovens in bakehouses? In the issue of "The Gas Salesman" last week, an expert was writing on "The Merits of the Gas-Fired Bakers' Oven," and in the "Electrical Review" an article has claimed attention to the automatic reel-type of electric baking oven, which is an American invention, put on the market by the Westinghouse Electric and Manufacturing Company, of Pittsburgh. Towards the end of this article, we read that a sample of the newest of electric baking-ovens is being erected in one of the most up-to-date bakeries in this country; and it is added that, considering the advantages set out in the article, "the general use of electric bread-baking ovens automatically controlled should not be long delayed." The "general use," and, in fact, the whole of the statement, convey a brave optimism. But, of course, there are other claimants to consideration; and the final arbiter is not the electrical man, but the baker who has to pay, and who looks to practical results. The best practical test is the quality of product, having regard to economy; and that is the one which attracts our friends the bakers. The contributors both to "The Gas Salesman" and to the "Electrical Review" claim high quality and uniform product from the different ovens and means of heating which they advocate. We do not think there are actually many electrically heated bakers' ovens in this country; but the writer in our contemporary suggests or pretends that there are. He says that the fact that electrical methods have been introduced, in spite of the handicap of high prices, is due to the high-grade product which can consistently be secured by these means, and so gives invariable satisfaction to the customer. "These means" refers to electric power and heating—"power" in the article being mentioned before "heating." "Power" has little to do with baking; and we submit there is more electric power used in bakeries than electrically developed heat. This is not by any means admitting a great deal if we exclude certain imposing bakeries, and have regard only to those that constitute the great majority. We have seen "electric bakery" outside some confectioners' shops. But when inquiry has been instituted, it has been found that electrical operation is in power only, and that it is not for electric heating that the electricity is used. It is as bad as the hairdresser who exhibits a prominent notice "electric hair-brushing;" and one finds that all it amounts to is that the shaft which operates the brushes is driven by a small electric-motor. It is humorous—the way in which electricity is used for endeavouring to develop business on a basis of pretence. However, the writer on electrically-heated bakers' ovens states that there are many designs of such ovens at present in use. This suggests a large number are in operation, but that is not the case in this country. It may apply in countries where electrical energy is cheaply produced by water power. But none, we are told, has as yet achieved the perfection of the electrically-heated automatic baking oven, with which "the results are uniform, and the food is more thoroughly cooked." If this means anything at all, it is that all the other types of electrically-heated bakers' ovens ought to be scrapped, as the inference to be drawn from the statement is that with them the results are not uniform, and the food is not thoroughly cooked.

In the Bakery.

Practical Proof of the Success of Gas-Fired Ovens.

The expert who contributed the article to "The Gas Salesman," also makes a great point of uniformity and high quality of product; and he claims that this is on the side of gas—especially high-pressure gas heated ovens. He discussed the matter of costs, and shows that, as a rule, the baker only takes account of the cost of fuel, and not what the fuel and methods of heating entail in addition. But he gives the baker credit for knowing a great deal about the essentials which are summed-up in the word "quality," and for appreciating this as being something superior to fuel cost. He realizes that high quality creates business in his products, and that the greater the business, the lower the costs. The writer of the article says the argument for gas-firing comes down to this: Does it really improve quality so markedly that an increased sale is assured? And we are told that gas-firing is on certain ground in this respect. Every baker who has applied it finds his sale steadily increases. The proof of the quality of the bread and other products is found in the increased sale. It is mentioned that cases are known where four or five large travelling ovens were required to meet the enhanced trade. Why was this? Simply owing to the demand for the product. It is unnecessary for the baker who uses gas-fired ovens to advertise the fact. The quality of the bread and other products does all the advertising necessary; and this is particularly so where high-pressure gas is employed.

The Atmosphere in the Oven.

We will not describe the revolving reel electric-oven for bakers. But there is a point in the article in the "Electrical Review" which is somewhat opposed to what the writer in "The Gas Salesman" has to say. It is said that with this new electric-oven, when it has been loaded and the door closed, all that has to be done is to keep the reel revolving during the baking period. The temperature being maintained constant, and the conditions the same, every batch can be made to turn out perfectly, evenly raised, uniformly and richly browned, and thoroughly baked. All this applies equally to the gas-fired oven. But the excellent attributes of the electric-oven do not stop there. "It has been shown that [with the automatic reel oven] the amount of flour required to turn-out a specified number of loaves was actually less than with ovens previously installed, and the saving represented by the additional loaves was more than sufficient to pay for the electricity used." Then comes a point in which the two writers appear to disagree. One says: "The electric-oven is constructed to retain the steam driven out of the loaves, so that it is unnecessary to inject live steam into the oven, and the use of a steam-boiler can thus be avoided." The other writer says: "Science is altogether on our side. Why is it that electrically-heated ovens are not universally used? They are simple and clean, and very nice to look at. They are costly—in current especially, but that is not by any means the only reason why they are not used. The real reason is that in an electric-oven, you have only heat; and you have not got the atmosphere so essential for baking bread that has a good flavour and good baking qualities. A few years ago the writer was present at some experiments in baking bread where a gas-oven, an electric-oven, and a very old-fashioned hot-air oven were used. The bread baked in the electric-oven was entirely lacking in flavour, and it grew stale in six hours. The bread from the hot-air oven had the best flavour. That from the gas-oven was very little behind in flavour; but it remained fresh and moist longer than any of the others." Why was it the bread from the electric-oven lacked flavour and became stale so quickly? The writer says: "We were now certain that the electric-oven lacked 'atmosphere,' and a mixture of CO_2 and steam was forced into it. The bread baked this time was as good in every particular as any of the others." This is the indication that atmosphere in the oven has much to do with success in bread-baking. This fact was recalled to the writer's mind when the success of the gas-fired travelling oven began to be talked about. The cause for the success was at once apparent. High-pressure gas is used; and the baker has his oven flooded with that atmosphere which is absolutely a *sine quâ non* for the production of bread of the highest quality. Thus we have one expert highly favourable to gas-fired ovens for bakeries; and the other very favourably disposed to electric-ovens. But the point raised by the former as to the relation of atmosphere to quality is one that cannot be disposed of by words. The results of practical experience have carried the gas-fired ovens much farther than electric-ovens along the road of application in bakeries.

Hire-Purchase of Electric-Cookers.

The Stoke Newington Borough Council Electricity Committee are getting highly daring and prodigal. They have recommended that the Department should be authorized to supply electric-cookers on the hire-purchase system, subject to the necessary estimates being passed by the Finance Committee. With this in view, they suggest the acquisition of ten electric-cookers at a cost of £12 6s. each, to be sold on the hire-purchase system, the period of repayment not to exceed seven years. The £12 6s. is a figure below anything quoted for a cooker in a price-list before us; so that these cookers cannot be of the highest grade. They are to be paid for in seven years. At cost price this will be 35s. a year; and somebody has to pay the interest on the money, also the maintenance. At the end of seven years, what will be the condition of the cooker? The Committee also desire to be authorized to purchase, at a cost of £130, an electric-cooker suitable for cooking for ninety persons, and to sell it on the hire-purchase system to the Female Guardian Society—repayment to be made by the Society at the rate of £25 a year for a period of seven years. This will make £175, or £45 more than the original cost! This seems a stiff price to have to pay for an oven to cook for ninety people.

A Personal Opinion.

Most, if not all, of the electrical papers have with the utmost satisfaction published a paragraph regarding a personal opinion of the Chairman of the Barnsley Gas Company. It was a statement made at the annual meeting of the shareholders. The Chairman (so it is reported) said: "There is a grand future for gas in heating and cooking, but I don't think for lighting purposes. In that the electric light can beat us; but we can provide heat at a third or a quarter of the cost of electricity." We do not deny that this may be the opinion of the Chairman of the Barnsley Gas Company. But he does not happen to be the Chairman of all the other gas undertakings in the country; and he is not the mouthpiece of the industry. He himself would not claim that position, nor that any gas experiences that Barnsley may have are wholly representative of the experiences throughout the country. If electric light can, in its over-all cost and in all places, beat gas for lighting, why is it that the gas industry sends out such a large proportion of the gas sold after daylight fails at this period of the year onwards into the spring?

Shocks and Dirty Lamp Bulbs.

An electrical accident that is regarded as unique is reported in "Electrotechnische Zeitschrift;" and it is referred to in a recent issue of the "Electrician." A woman touched the bulb of an electric-lamp in a bathroom, and received a fatal shock. Her feet were bare, and evidently her

hands were moist. But (our contemporary says) the presumed mode of contact with the electricity supply is interesting. The room had been newly decorated; and the bulb had become coated with a thin layer of moist plaster, which made a direct connection with the lamp socket. The reference to the accident continues: "Experiments have since shown that, if a lamp bulb is painted with a streak of some more or less conducting fluid stretching from the tip to the cap material, differences of potential along the bulb may exist; so that a person making a good contact with earth might conceivably receive a shock by touching it. As the writer of the article points out, "such incidents are extremely rare—indeed, we cannot recall having heard of a parallel case. But the occurrence suggests an additional reason for keeping the bulbs of lamps clean, beyond the obvious desirability of avoiding loss of light through accumulations of dust."

Depression and a Super-Tax.

The industries of Sheffield, in common with other industries in the country, have been suffering heavily from the general depression in trade. The Electricity Department of the Corporation have felt this very acutely. The revenue last year was only £753,148, compared with £982,546 in 1921. This was partly compensated by the working expenses dropping from £643,617 to £481,036. But the balance, after taking into account the figures of the installation and motor department, was only £273,578, against £349,495—a decrease of £75,917. The interest and sinking fund charges required £261,754; and the net balance was only £11,824, compared with £116,330. Although the net balance does not allow of this being done, it is intended to transfer £30,000 to the relief of the rates, for which purpose there is to be a raid upon the reserve fund, which will then be reduced to £45,766, with the capital expenditure standing at £3,711,882! But probably it is thought this is permissible in view of the renewals and special expenditure funds. Anyway, there can be no defence of this on the ground of sound finance. The utilization of profits of a municipal trading undertaking in relief of the rates is a policy against which we have always protested—no matter whether the undertaking trades in gas, electricity, or anything else. Those undertakings make their contribution to the rates in the ordinary course, without having this super-tax put upon them and those who patronize them. In the case of the Sheffield undertaking, heavy capital expenditure at high prices had to be indulged in to meet wartime demands, and the capital now stands at £40 per kw. of plant. If there is any money to spare, it ought to be devoted to writing-off some of this excess capital, or there should be utilization in some other way to the general benefit of the undertaking. What we hold should be the policy in this respect of a municipal gas undertaking is what should be the policy in the case of any other municipal trading concern. One more point. Though there was a serious decrease in the number of units sold by the Sheffield concern last year—from 141,362,000 to 103,170,000—the number of consumers ascended from 12,428 to 15,196. Nevertheless, the average consumption has shown a remarkable decline. There is little doubt that electricity undertakings have already obtained the cream of their business. Extensions are now being made into a totally different order of custom; and average consumption is on a rather steep and slippery slope.

"B.C.G.A." BRISTOL PROGRAMME.

The full programme has now been issued of the forthcoming eleventh annual general meeting and conference of the British Commercial Gas Association, which is to take place in the Museum and Art Gallery at Bristol, on Monday, Tuesday, and Wednesday, Oct. 16, 17, and 18, under the presidency of Alderman Sir George E. Davies, J.P., Deputy-Chairman of the Bristol Gas Company.

Order of Proceedings.

Monday, Oct. 16.

7.30 Reception by the Rt. Hon. the Lord Mayor of Bristol, Alderman E H. Cook, D.Sc., J.P.
8 15 Lecture by Sir Henry Gauvain, M.D., on "Light and Life."
9.0 Light refreshments. Music.

Tuesday, Oct. 17.

Annual General Meeting and Private Conference.

10.15 Assembly of members.
10.30 Address of welcome by the Rt. Hon. the Lord Mayor of Bristol and by Mr. J. H. Howell, J.P., Chairman, Bristol Gas Company.
11.0 Presidential Address by Alderman Sir George E. Davies, J.P.
11.30 Presentation of annual report and statement of accounts, by the Executive Chairman, Mr. F. W. Goodenough.
12.0 Paper: "B.C.G.A. Service in Relation to Local Sales Development," by the Secretary of the Association, Mr. J. C. Walker.
12.30 Announcement of election of the President and Auditors for the ensuing year.
1.0 Light luncheon, at the invitation of the Bristol Gas Company.

Public Conference.

Subject: "The Gas Industry as a Public Service."
2.30 Opening remarks by the President.

Papers.

"The Consumer's Point of View," by Mr. S. E. Halliwell, Secretary and Commercial Manager of the Bristol Gas Company.
"Gas as a Domestic Servant," by Mr. W. N. Westlake, Engineer and Manager of the Exeter Gas Light and Coke Company.
"Some All-Gas Houses," by Mr. P. S. Hoyte, Engineer of the Plymouth and Stonehouse Gas Light and Coke Company.
"Gas Service in Health Resorts," by Mr. P. G. G. Moon, Engineer and General Manager of the Bournemouth Gas and Water Company.

5.0 Afternoon Tea.
7.30 Dinner by the Chairman and Directors of the Bristol Gas Company to the President, Vice-Presidents, members, and visitors, at the Victoria Rooms, Clifton.

Wednesday, Oct. 18.

Public Conference.

Subject: "Gas as a Service to Industry."
10.45 Opening Remarks by the President.

Papers.

"Modern Gas Lighting, with special reference to the Illumination of Factories and Workshops," by Mr. Robert Watson, Engineer and Manager of the Doncaster Corporation Gas Department.
"Gaseous Fuel and Power in Industry," by the Manager of the Association, Mr. W. M. Mason.

1.30 Luncheon by the Vice-Presidents and members of the Association to the President of the Association, the Chairman and Directors of the Bristol Gas Company, at the Victoria Rooms, Clifton.

B.Th.U. Standard for New York.

The Chairman of the State Public Service Commission in New York (Mr. William A. Prendergast) has announced a reduction in the rates to be charged by gas companies in New York, the establishment of a sliding-scale to benefit large consumers, and a change from a candle power to a calorific standard. The reduced rates and change in standard were to come into effect on the 1st inst. In order to secure the most economical conditions, the Commission suggest that all subsidiaries of the Consolidated Gas Company be merged with the parent concern, and that all subsidiaries of the Brooklyn Union Company be merged with their parent undertaking. For the great majority of gas consumers—those using the services of the Consolidated and Brooklyn Union Companies—the new rates will mean a saving of 10 c. per 1000 c.ft., or a rate of $1·15, instead of $1·25. The saving will be 5 c. per 1000 c.ft. in the case of ten smaller companies. The introduction of a sliding-scale will result in savings up to 30 c. per 1000 c.ft. for large consumers. Under the new order the gas must have a calorific value of not less than 537 B.Th.U. per cubic foot on a monthly average, and not less than 525 B.Th.U. on any three consecutive days. In adopting the calorific standard, the Commission pointed out that it was in use in every large city in the country except New York. A report prepared by the Commission indicates clearly that the illuminating standard is an obsolete and uneconomical one, and that better, because more uniform, service is obtainable by the adoption of a calorific or heat standard. In an interview, Mr. Robert A. Carter (the Vice-President of the Consolidated Gas Company) is reported to have said that the rates fixed are not adequate under present conditions, or any conditions which can now be regarded as being reasonably in prospect; but they would be given a fair trial.

Gas for Lead-Coating Pipes.

There is a plant, to which reference is made in the pages of the "Gas Age-Record," supplied from the mains of the Public Service Company of Northern Illinois, in which gas proves highly efficient and adaptable for the lead-coating of steel mains. The principal difficulty hitherto encountered in getting the lead to adhere to steel has been that of obtaining an absolutely clean surface on the metal to be processed. This has been accomplished by depositing a thin coating of mercury on the steel in a plating bath previous to applying the lead; but the cost of this has been excessive. The concern alluded to has installed a cheap and simple method, which is claimed to produce a uniformly dense coating of lead on steel pipe. In the first place, the steel is thoroughly pickled in muriatic acid to remove scale formations; and it is then rinsed, first in cold water, and then in a hot sal-soda solution, to remove all traces of the pickling acid. The temperature of the sal-soda bath should be maintained at boiling-point to ensure rapid drying with minimum oxidation when the metal is again exposed to the air. After thorough drying, the metal is dipped in a good soldering flux, and then into a hot lead pot containing an alloy of 15 p.ct tin and 85 p.ct. lead. Brighter finishes can be produced by increasing the tin content. Immediately upon removal from the lead bath, the surface is wiped to take away any excess of lead. The finished product presents an impervious surface, uniform in appearance, which successfully resists acid action. The hot sal-soda bath and the lead pot are heated by gas, which ensures perfect temperature control.

INAUGURATION OF SECTION II. OF THE PROVAN (GLASGOW) GAS-WORKS.

Last Thursday, to mark the completion of the extension of the Provan Gas-Works, the Lord Provost, the Convener, and members of the Gas Committee of the Corporation of Glasgow made an official inspection of the undertaking, to which gentlemen prominent in the gas industry throughout Scotland were invited. There was no formal ceremony connected with the inspection; but during the tour of the works, Lord Provost Paxton and Councillor Thomas Young (Convener of the Gas Committee) each, by means of the electric appliances, "tipped" a wagon of coal into the hoppers. After the inspection, there was a luncheon and some speeches, a report of which is given after the description of the new section, prepared from a booklet distributed among those present.

DESCRIPTION OF THE NEW SECTION.

The site for the Provan Gas-Works, an area of about 123 acres, was acquired in 1899, when the demand for gas approached the limit of the capacity of the four works then in operation. Constructed to the designs, and under the direction, of the late Mr. William Foulis, M.Inst.C.E., who held the position of Engineer and General Manager for 34 years, the first section of the works was completed in 1904. The installation was planned to produce 12,000,000 c.ft. of gas per day from the best quality coal. After the year 1904, the demand for gas continued to increase, and the following additions to the plant became necessary: 144 vertical retorts at the Dawsholm Gas-Works, 240 vertical retorts at the Dalmarnock Gas-Works, and water-gas plants at the Provan, Temple, and Tradeston works.

These extensions were designed to meet immediate and rapid growth of consumption. The solution of the more important problem, substantial provision for the future—a necessity clearly indicated by an ever-increasing demand—remained in abeyance until 1919, when the Committee, fully realizing that considerable extensions and modifications could no longer be delayed at Provan, decided to appoint a deputation, consisting of the Convener (Councillor Drummond), the Sub-Convener (Bailie Thomas Young), and Councillors Kennedy and Somerville, accompanied by the officials, to "consider and report as to the advisability of abandoning the horizontal retorts in operation in the Provan, Dawsholm, and Tradeston Gas-Works, and erecting in the said works vertical retorts in substitution therefor." The deputation visited many places in Scotland and England, and examined and considered various systems of carbonizing coal in vertical retorts.

JOHN W. M'LUSKY, A.M.I.M.E.
The Engineer and General Manager.

THE WOODALL-DUCKHAM INSTALLATION.

The investigations of the deputation resulted in the issue of a specification by the Corporation and the placing of a contract with the Woodall-Duckham Company, Ltd., on Sept. 15, 1919, for a plant to handle, break, elevate, and carbonize 1356 tons of coal per 24 hours. Considerations influencing the Committee's selection of this plant were: Convenience of arrangement, simplicity of process, satisfactory output, economy of manufacture, promptness of execution, and comfort of working. As far as possible, the new plant is divided into four sections, each of which is complete in itself. Each section consists of two benches (48 retorts), which are served by their own tippers, coal breakers, and gravity bucket-conveyors. Should the auxiliary plant of one section fail, the section affected can be served from the adjacent section by means of a travelling cross-conveyor. Considering the great difficulties of procuring materials, and the frequent labour troubles, the work was executed with commendable despatch. On Dec. 9, 1921, 48 retorts were in use; 48 more on Feb. 17, 1922; and the remaining 96 are ready for use when required.

COAL-HANDLING PLANT.

The ground at Provan falls 43 ft. from west to east; coal being delivered at the high-level, and coke despatched from the low-level sidings, with none of the plant below ground-level. Connected with the high-level railway sidings are the Caledonian, North British, and Glasgow and South-Western Railways. Coal received at these sidings is weighed, and then either placed in stock in the coal store (which can accommodate 50,000 tons) or is taken along the overhead railway to the tippers. It is there discharged by electric tippers into the coal hoppers below the rails. If the coal arrives in hopper-bottom wagons, it is discharged by gravity into the same hoppers.

Jigging screens pass the large coal to the breakers, but screen out the small, which joins the broken coal from the breakers at the gravity-bucket conveyors below. The gravity-bucket conveyors are approximately 860 ft. long, and one of them supplies a section of two benches with coal at the rate of 80 tons per hour—an amount sufficient to accumulate and store a week-end supply over the retorts in a working period of from eight to nine hours; or, alternatively, to serve, in the same time, two sections with a full day's supply from one conveyor working in conjunction with the cross-conveyor.

The conveyor does not encircle the retort-benches. It completes its return journey on a track immediately over the outward track, and picks up coke and fills coke-hoppers along the inward journey.

The broken coal is elevated 66 ft. by the lower strand of the conveyors and deposited in the steel hoppers over the vertical retorts, to which they are connected through valves by closed feeding chambers.

THE RETORTS.

There are 192 vertical retorts arranged in eight benches of 24 retorts each. Each retort is a tapered chamber of fireclay placed vertically, measuring 7 in. by 6½ in. at the top, and enlarging to 19 in. by 78 in. at the bottom. It is 26 ft. long, and can carbonize 7 tons of coal in 24 hours. The yield of gas per retort is from 88,000 to 100,000 c.ft. per 24 hours; the quantity varying with the quality of coals under treatment and the thermal value of the gas produced.

The retorts are built of fireclay bricks, tongued and grooved together so as to prevent leakage of gas through the joints. Each retort is surrounded by a fireclay wall connected to it by vertical cross division walls, forming flues outside the retort, to the top of which fuel gas and heated air are admitted and burnt, thus providing the necessary heat for carbonization of the coal within it.

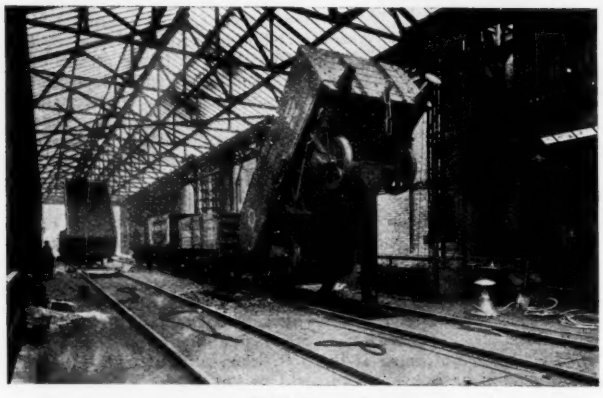
The working of the retorts is then described in the pamphlet, together with the feeding of the producers with coke. There is a waste-heat boiler to each bench, and the waste heat thus recovered makes more than sufficient steam to work the whole plant. When the cold coke is drawn from the receivers below the retorts, the full skips are lifted by the overhead cranes and the coke deposited in concrete hoppers over the coke bunkers. It is then passed in regulated quantities over "cascade" riddles and through rotary screens, which grade the coke, into the compartments of the bunkers, which hold a week-end supply. Railway trucks receive the coke from the bunkers when the bottom valves are opened, and are hauled by the works locomotives to the low-level sidings for despatch to customers.

CONDENSING, SCRUBBING, AND EXHAUSTING PLANT.

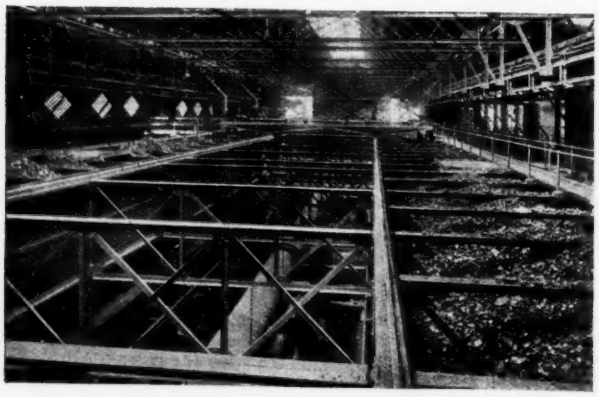
The crude gas is drawn through retort-house governors to the atmospheric condensers. The four foundations of the atmospheric condensers consist of tanks of about 120,000 gallons capacity each, arranged in pairs, with a receiving tank and separator placed under the pump-house between each pair. Tar and liquor, from all parts of the plant, are collected in the receiving chambers, and then pumped into the separators through cooling coils placed in water tanks over the pump-houses. The separated tar and liquor flow from the separators to the respective compartments of the storage tanks. When one storage tank is full the supply is diverted into another, and the contents of the first are pumped to the residual works. Pumps which supply washing tar to the hydraulic mains and water to seal the discharge doors of the retorts are located in the pump-house, also one of the electrical switchboards referred to later.

Cooled and partly purified gas is drawn from the atmospheric condensers through an overhead main, 4 ft. in diameter and 793 ft. long, and through a vacuum governor, by three turbo-exhausters. Two of them are driven by condensing steam turbines, and one by electricity. These exhausters draw the gas from the retorts and force it through the scrubbing plant to the holders. They all deliver into one outlet main, 5 ft. in diameter, called the omnibus main. Five complete sections of scrubbing plant are connected to this omnibus main, each section consisting of a volumetric governor, by which the quantity of gas passing into the section is regulated, a Pelouze and Audouin tar extractor, a water-tube condenser, a Livesey washer, a centrifugal primary scrubber (in which weak ammonia liquor, projected in fine spray through the gas by centrifugal force, removes ammonia present in the gas), a rotary secondary scrubber (which completes the washing of the gas with pure water to remove the last traces of ammonia, or to reduce them to a definite proportion), and a rotary meter (which indicates to the attendant in the exhauster-house the volume of gas passing, and enables him to regulate the exhausters and adjust the volumetric governors to pass the correct volume of gas to each section of the scrubbing plant). After the liquor leaves the rotary scrubber it is pumped into the centrifugal scrubber, and thence to the Livesey washers, becoming stronger in each apparatus. It then flows through the tar main to the tar tanks under the atmospheric condensers.

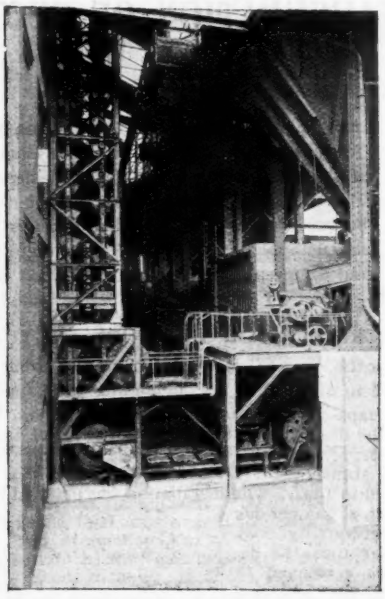
Coal Store.



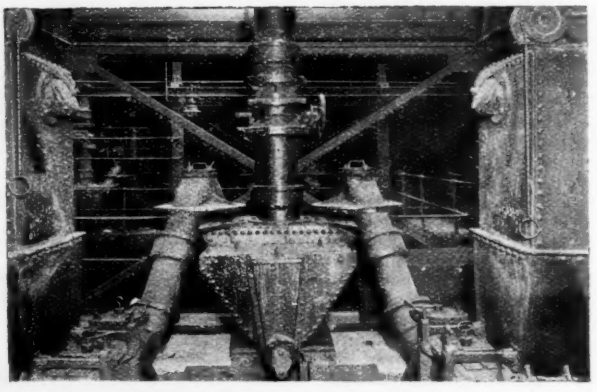
Truck Tippers.



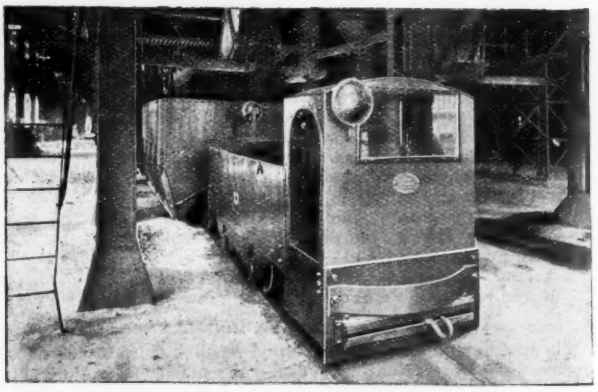
Top of Hoppers and Cross-Conveyor.



Jigging Screen, Coal Breaker, and Gravity-Bucket Conveyors.



Charging Chambers and Hydraulic Main.



Discharging Chamber, Ash Shoot, Skip, and Electric Locomotive.

THE PURIFIERS.

When the gas has passed the rotary meters it is collected in a common main, 4 ft. in diameter, and conducted to the purifiers, of which there are four sets, each complete with its "catch-box." Each set of purifiers consists of four reinforced concrete boxes. A revivifying floor and oxide store are placed over the purifiers.

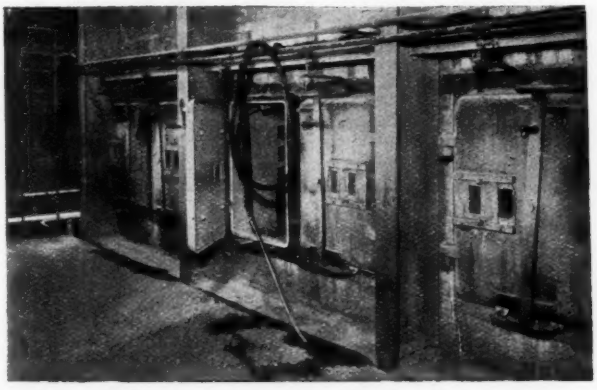
THE METER-HOUSE.

The clean gas traverses another 4 ft. main from the purifiers to the meter-house, where it is finally measured on its way to the holders. There are four different types of meters in the house: (1) The old type, measuring by revolving drum. (2) A type measuring by the quantity of electric current required to heat the gas a definite amount. (3) A type measuring by the reduction of pressure caused on the underside of a diaphragm placed in the main, measured electrically. (4) A type measuring by the decrease in pressure due to the gas passing through a "Venturi" tube. Each of the three last will measure one-and-a-half times as much as the three drum meters combined.

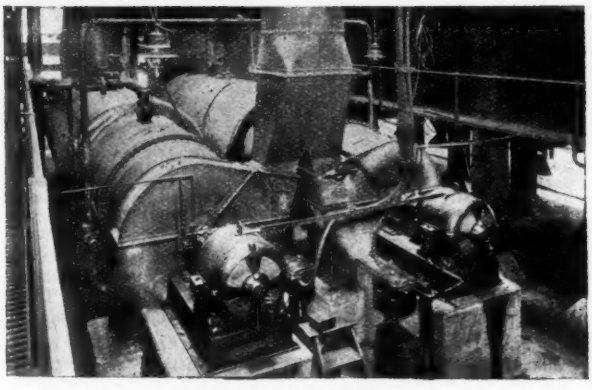
From the holders the gas is distributed to the consumers, either by the weight of the holders themselves or by means of turbo-boosters, which can force the gas into the holders at the Dalmarnock and Tradeston works for subsequent distribution. In fact, gas from Provan can now be distributed to any part of Glasgow should the occasion arise.

THE ELECTRICAL PLANT.

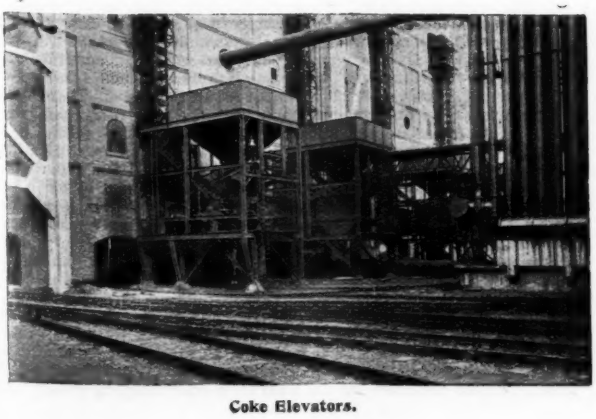
The whole of the plant, with the exception of two sets of exhausters, three sections of scrubbing plant, and the boosters, is electrically driven. The electric supply is obtained from the Electricity Department at 6500 volts, and in the transformer-house is transformed down to 440 volts for power, and 250 volts for lighting. From the transformer-house one cable goes to the exhauster-house, and feeds the electrically-operated exhauster, gas-meters, and several auxiliaries. The remaining six cables feed the north and south switch-houses. The north switch-house feeds the north half section, and the south switch-house feeds the south half section, each of which is electrically separated from the other.



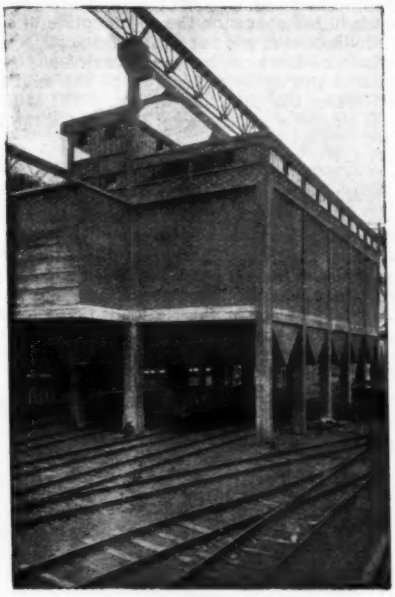
Three Producers.



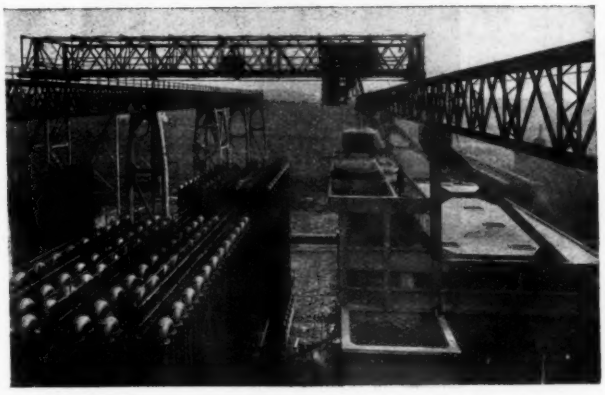
Two Waste-Heat Boilers.



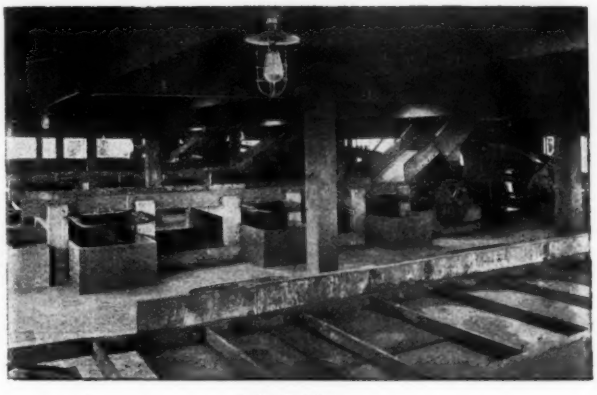
Coke Elevators.



Coke Bunker.



Crane, Hopper over Coke Bunkers, and Atmospheric Condenser.



Coke Riddles.

In the retort-house the coal breaker and the coal conveyor in each section are so wired that it is impossible to start the coal breaker till the coal conveyor is running, thereby preventing the coal breaker from being choked. Owing to the great length of the conveyor chain, it has been found advisable to instal stop push-buttons at intervals, so that in an emergency the breaker and conveyor can be stopped instantaneously from seven different points.

The switchboards in the pump-houses control the water, tar, and liquor pumps, travelling cranes, and coke riddles. All the pumps are arranged for automatic starting and stopping, according to the depth of liquid in the tanks.

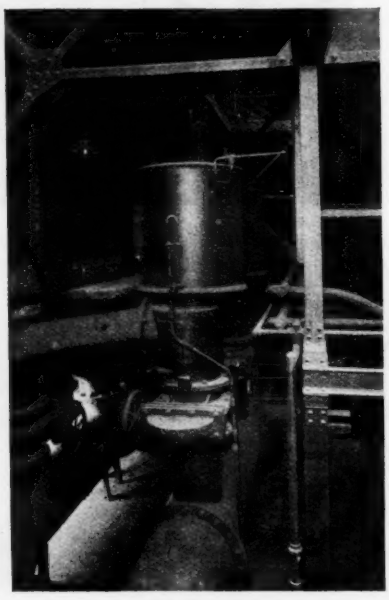
In the event of the failure of the supply cable to the north pump-house, or the cable to the south pump-house, a linking device has been installed which automatically connects, after an interval of five seconds, the dead switchboard to the live one, and thus enables the water and tar pumps—the most vital pumps in

the installation—to be kept running. It is estimated that when the plant is in full operation the consumption of electrical energy will be 2 million units per annum.

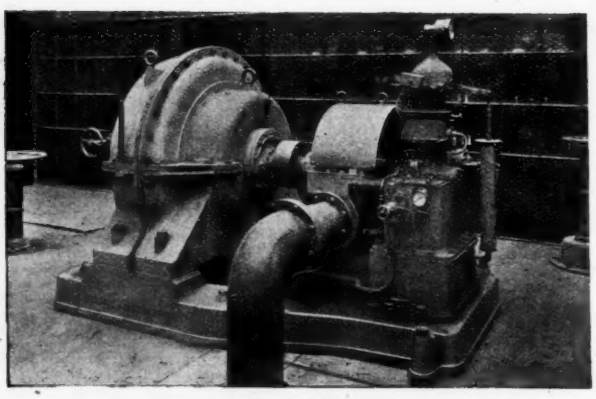
The whole of the work has been carried out by contractors to specifications and designs prepared by the staff of the Gas Department under the direction of Mr. J. W. M'Lusky, Assoc.M. Inst.M.E., Engineer and General Manager of the Department.

THE LUNCHEON.

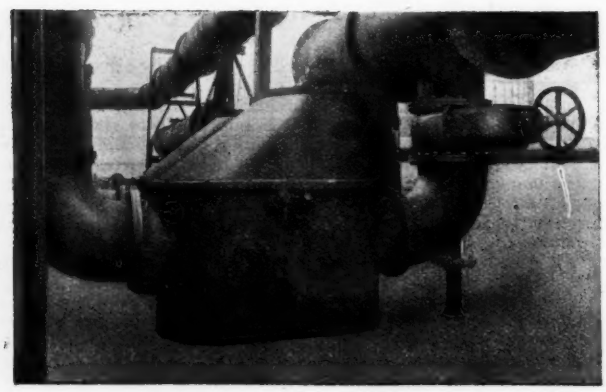
The guests of the Corporation were entertained at luncheon, which was served in the City Chambers. Lord Provost Paxton presided; and supporting the Chairman were Sir Arthur Duckham, K.C.B.; Sir James Kemmal; Sir Alexander Gracie, the Dean of Guild of the City of Glasgow; Sir John Lindsay, Town Clerk; Sir John Hunter; Sir John Reid; Mr. D. Milne Watson, M.A., LL.B., President of the National Gas Council; Councillor Thomas Young, Convener of the Gas Committee; Councillor Robert Renfrew, Sub-Convener; Mr. Thomas Hardie, Chief Engineer of the Gas Light and Coke Company; Mr. Alexander Wilson, formerly Gas Engineer and Manager to the Glasgow Corporation; Mr. James Gray; and Mr. John W. M'Lusky, the Engineer and General Manager of the Glasgow Corporation Gas Department.



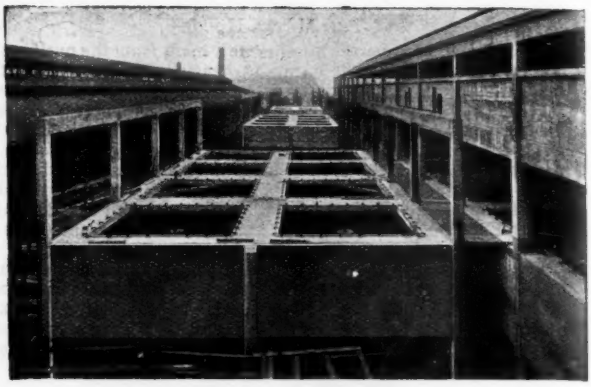
Retort-House Governors.



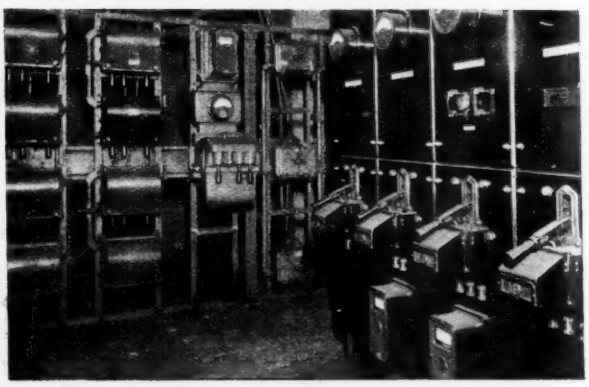
Turbo Exhausters.



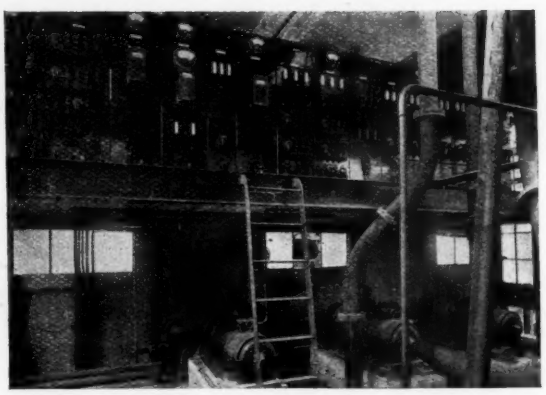
Rotary Meter and 48-in. Inlet Main.



Catch-Boxes and Purifier Houses.



Sectional Switch-House.

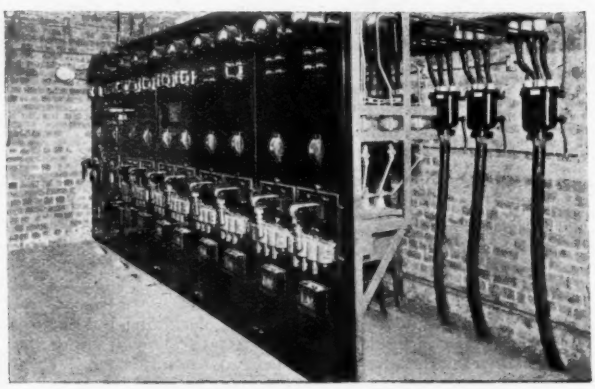


Switch-House for Cranes, Riddles, and Pumps.

Mr. D. Milne Watson, in proposing the toast of "The Corporation of Glasgow," said he felt that the present occasion was an important one in the history of the city, and also in that of the gas industry. He esteemed it a privilege to be allowed to propose this toast; and representing, as he did, a gas company in the Metropolis, he would like to associate with the sentiment the members of the Gas Committee of the Glasgow Corporation. It was always a pleasure to one who was connected with a gas company to view the work and activities of a corporation. On this aspect of the question, he had always maintained that gas companies and corporations should work hand in hand, because, so far as this branch of the business was concerned, there was no distinction between their interests. Glasgow had always been a model to those who admired the civic life of the country. She had been in the forefront of many municipal enterprises; and from what they had noted that day, it was evident she intended to be in the fore-front with regard to gas. He supposed they all knew (probably better than he did) the enormous strides which the city had made. In 1801 the inhabitants of Glasgow numbered, he believed, 73,000; while to-day the population was in the region of a million and a quarter. Not only this, but, as illustrative of the progress the city had made in the lifetime of most of those present, he might mention that the Glasgow Corporation took-over the interests of the Company, who then operated the gas-works, in the year 1869; and their total output was, he thought, 6 million c.ft. Furthermore, according to a book he had been reading on the subject, they sold gas at a moderate price. He did not know exactly what they were charging in Glasgow

at the present time—he could not say whether the price was moderate or not—but one thing was certain, that the supply was one which the citizens of Glasgow very much appreciated, because the new addition to the works at Provan would turn out no less than 18 million c.ft. of gas per day—three times as much as was attempted altogether in the year 1869. This was a splendid record, and one which had been achieved largely because of the personality of the gentlemen who had been members of the Gas Committee and the Managers and Engineers whom they had enlisted into the civic service. Incidentally, he ought to inform those present that he first became acquainted with Lord Provost Paxton when he was Chairman of the Gas Committee; and it was due to that gentleman's initiative in getting the Corporation to let-out free of charge different types of gas-cookers, that a tremendous difference was effected in the consumption of gas in Glasgow. It always seemed to him that if a municipality was fortunate enough to have gentlemen at the heads of departments who were capable of taking a long and broad view of a situation, they need have no fear of their progress. There had been a succession of distinguished gas engineers in Glasgow; but under the able guidance of Mr. J. W. M'Lusky (the present head), they were going on from success to success. Coming, as he (the speaker) did, from London, many of those present would be expecting he would say something about the therm. It might be somewhat of a disappointment to them, but he did not propose that day to introduce any particular reference to such a controversial topic. Notwithstanding the "Daily Mail," he was glad to say that many gas engineers were alive and well. [Laughter.] Glasgow had not yet gone the length of the therm; but even if she did, he could assure them that they did not need to fear the future. He was one who believed that the future of gas was absolutely assured. They were all supplying something that was an absolute necessity to modern life. It was clear that the Corporation of Glasgow personally believed in its future—else they would not have ventured on such a magnificent new installation as the one they had seen. He hoped that Glasgow would have every measure of success in her gas enterprise, and that all prosperity would attend her other civic activities.

Lord Provost THOMAS PAXTON, with whose name the toast was coupled, said that many of the company would be under the impression that what they had seen that day at Provan was Glasgow's pioneer movement in the direction of installing vertical retorts. He personally



Switchboard in Transformer House.

wanted to give them the assurance that it was nothing of the kind. He could recall the time—he himself (the Lord Provost) being the Convener of the Gas Committee—when, in collaboration with a former Convener (Bailie Kirkwood), they had installed at Dawsholm an experimental system of vertical retorts. With perfect clearness he remembered when the question of verticals or otherwise was raised. At that period, he was just a little afraid that there would be some strong objection to the introduction of the system. The proposal for the adoption of an experimental system of verticals was, however, carried. The particular retorts at Dawsholm cost Glasgow something between £30,000 and £40,000. In those far-off days, this was considered to be a big sum. They were rather more modest then, for nowadays it appeared to him they spoke in millions. In connection with these experiments, he never thought—indeed, he did not think it even yet—that his good friend, Mr. Alexander Wilson, the ex-Manager of the Glasgow Corporation Gas Department, got full credit for all his efforts. He was delighted to see Mr. Wilson in their midst that day. Mr. Wilson and he (the Lord Provost) had many long discussions over certain things; and he never once found the city's former Gas Manager at all unreasonable. There could be no denying the fact that the Gas Department had made extraordinary progress during the past twenty years. At one time both Mr. Wilson and himself held the belief somewhat strongly that if they could afford to give the people of Glasgow free stoves on loan, it would be possible to increase the consumption of gas to a marked degree. On four different occasions such a proposal was recommended by the Gas Department. They had a great deal of opposition to face; and he would like to mention the help he received from a Labour member of the Council, Mr. John Taylor, of Govan. It might be the last opportunity that would come to him of paying a tribute to his memory; and so he wanted to say how much he appreciated the assistance he received from the late Mr. John Taylor in the agitation for free stoves on loan. The scheme was ultimately pushed through; and while he was not going to say it was the direct result of this, it was rather interesting to reflect that soon afterwards the price of gas was reduced to 1s. 11d. per 1000 c.ft. It was also interesting to recall that, while associated with the Gas Department in the old days, he fought consistently for recognition of the idea that the manufacture of bye-products should be in their own hands—that was to say, in the hands of the city. An experiment on the lines he had all along recommended was tried at the Dalmarnock works, and proved an outstanding success. So successful was this experiment that the idea was developed at the other works throughout the city. Singularly enough, the men who were diametrically opposed to him in his theories were now managers of bye-product departments. Altogether the Gas Department was doing very well; and he hoped and believed that, with the new installation of verticals at Provan, he would live to see a substantial reduction in the price of Glasgow's gas. No branch of the Corporation had been so handicapped by the war as the Gas Department. They were much hindered in having to meet the demands of the Government in the matter of supplies necessary to the manufacture of explosives; but even while suffering from this serious handicap, they were doing the best they could for the citizens. In all the circumstances, he felt they ought to congratulate themselves on having that magnificent installation of verticals at the Provan Gas-Works. They need not worry over-much about the price, because they had got good value in the installation.

Councillor THOMAS YOUNG (Convener of the Gas Committee) proposed "The Contractors," with which he coupled the name of Sir Arthur Duckham, K.C.B. At the outset, he explained that the credit for the development at the Provan Gas-Works really lay with ex-Bailie Irwin, who was responsible for tabling the motion that a vertical setting should be installed there. He also desired to acknowledge the services of the former Manager, Mr. Wilson. At the time the scheme was under discussion, Mr. Wilson was in the service of the Corporation, and accompanied the members of the Gas Committee to various installations of verticals throughout the country. In reviewing the work of those who had helped, it was fitting that he should publicly thank their own officials for the manner in which they had undertaken everything. In particular, he singled out for special mention Mr. M'Lusky (the General Manager) and Mr. Harrison (the Engineer). It was now about 23 years since the ground at the Provan works was purchased at a cost of £78,000—the extent being 123 acres. Eighteen years ago the first section of the undertaking was completed; but in the interval the demand for gas had increased by about 6 million c.ft. per day. The old horizontal retorts, which numbered 1440, carbonized 1000 tons of coal in the twenty-four hours; while the new verticals, numbering only 192, were capable of carbonizing 1365 tons. The quantity of gas derived from the new retorts would be practically 20 million c.ft., as compared with 12 million c.ft. previously. Glasgow, in his opinion, had always had the reputation of being progressive in adopting up-to-date plants and labour-saving appliances; but in this instance he feared it had somewhat lagged behind, with the result that the slowness had been paid for. In point of fact, if the plant they had seen that day had been installed some years ago, before the war, it would have been at a much lower cost to them. It was in September, 1919, that the Gas Committee, after careful consideration, placed a contract for vertical retorts at Provan with Messrs. Woodall-Duckham. The first section of 48 retorts was in operation on Nov. 30, 1921, and the second section of 48 retorts on Feb. 17, 1922. The remaining section of 96 retorts was now ready to be put to work. This large installation would meet about two-thirds of the winter's demand. It would produce a greater quantity of gas per ton, while at the same time there would be a considerable reduction in labour costs. They should be able, with the lower prices now being paid for coal, to wipe-off a large portion of last year's deficit, while looking forward to a gradual and steady reduction in the cost of gas. At the same time, they must not forget to wipe-out gradually the debt accumulated during the war and post-war periods. Further contracts for plant required had been placed, and the total cost would amount to about £1,300,000. He believed he was correct in stating that the installation at Provan was by far the largest addition to any single gas-works that had been carried out at one time. He desired to express the appreciation of the Committee and himself of the way in which the various contractors had carried out their work during the past three years, which had been a period of very great difficulty. Sir Arthur Duckham, with whose name the toast was associated, was one of the best business men in the country. The same remark applied to his partner, Sir William Jones, who, being unwell, was unable to be with them. The other contractors were practically all local.

Sir ARTHUR DUCKHAM said that the job at Provan had been an epoch-making one, in that it was the largest extension of gas-making plant that had been carried out in the world at one time. It seemed to him that they must all appreciate the great courage the Corporation displayed in undertaking such a large enterprise, especially at the time they did. They must also appreciate the fact that the work had gone through very satisfactorily, and would redound to the benefit of the city. When the matter of the extension was first mooted, he discussed the situation with ex-Bailie Drummond and Mr. Alexander Wilson, and he could recall the capable way in which they handled the case. Indeed, he was certain Glasgow owed a great deal to these two gentlemen for the work they did. On behalf of his own firm, and of his co-contractors, he desired it put on record that they never received fairer treatment or more real help than they all did in the City of Glasgow. All the way through they had had nothing but assistance from the Convener, the Sub-Convener, the members of the Gas Committee, the Town Clerk's department, the General Manager and engineering staff, and last, but by no means least, the Works Manager and Engineer. Every help had been given in order to make the job not only a credit to the contractors, but to the city. The remark had been made by Councillor Young that most of the contractors were of local origin. On this point, he (Sir Arthur) might be permitted one observation—that, in regard to the work for which his firm were responsible, over 90 p.ct. of the material was of Scottish origin; and over 99 p.ct. of the labour was from Glasgow. This being so, Glasgow could justly claim credit for the undertaking. While a southern firm had the contract, it was in reality Scottish resources and Scottish labour that developed it. He wanted to comment on the expeditious way in which two great Scottish firms co-operated with Messrs. Woodall-Duckham & Co. Of this he felt quite certain, that both the Convener and the Engineers would agree in saying that in the difficult times when the undertaking was launched, the progress made was really excellent. In great measure

this was due to the manner in which the firms of Sir William Arrol & Co., and Messrs. David Colville & Son brought forward the supplies of steel. Such progress was made first because these two firms did their very utmost to keep the supplies up to time. He believed that the new plant at Provan would mean cheaper gas to the citizens; and to an industrial community like Glasgow, cheap gas was an essential to progress. He trusted that the gas in their city would be so cheap that another installation capable of carbonizing 1500 tons of coal would be required, and that all the contractors would again have the good luck to be in at the finish.

Before resuming his seat, Sir Arthur Duckham, on behalf of the contractors, presented Councillor Young, as Convener, with a diamond brooch for Mrs. Young; while the Sub-Convener, Bailie Renfrew, was made the recipient of a silver tea service. Both briefly acknowledged the kindness.

THE CATALYTIC PROCESS AT THE FOREST GAS-WORKS, BRUSSELS.

By M. G. Coune, of the Imperial Continental Gas Association's Works at Brussels.

THE accompanying drawing shows roughly the arrangement of the catalytic gas generating plant which has been on trial at the Forest Gas-Works. The oil to be catalyzed comes either from the tanks of fresh gas oil or from the cisterns containing products which have gone through a first process, but are not yet totally converted. It then runs through a holder on load, destined to supply each of the reaction retorts. There are six of these retorts, made of cast iron, and having a useful length of 3 m. and a useful section of 285 by 100 mm. The retorts provided with the catalyzer are heated by means of tar-burners, and kept at as constant a temperature as possible—this being essential to obtain satisfactory results.

On leaving the retorts, the gas and the products distilled enter a condenser, where thorough condensation takes place. In order to complete the work of this condenser, the gas next passes through a washer, which in this case is only a small column of coke. Afterwards the gas is measured by a 200-light wet meter, and sent into the water-gas mains, to be mixed as thoroughly as possible with blue water gas.

As stated by M. P. Mallet in the paper he read before the Société Technique de l'Industrie du Gaz en France,* this plant has had a four months' trial, during which 16,881 cubic metres of catalytic gas (596,185 c.ft.) were produced. This test has shown that:

1.—The process does not involve any real difficulty, and the gas production is as regular as can be.

In this respect, the analogy with the distillation of coal is complete. It may even be mentioned that the gas-works received exactly the quantity of gas which the Sté. Belge de Chimie et de Catalyse Industrielle undertook to supply, and that this quantity was exceeded on days when the heavy consumption of gas in town necessitated the employment of all available means of production. This goes to prove that the catalytic process allows a large margin for variation in the rate of production.

2.—The mean calorific value (gross) was about 15,000 calories per cubic metre (1686 B.Th.U. per c.ft.). The maximum reached was 16,800 calories and the minimum 14,000 calories per cubic metre.

The determination of the calorific value of this gas and blue water gas before and after mixing, brought to light the fact that no condensation worth mentioning took place. Besides, if any doubt were felt on the subject, condensation might be absolutely avoided by washing the gas more thoroughly than was done in this case.

3.—The spirit produced can take the place of motor spirit with satisfactory results.

It is very similar to benzole or heavy spirit. Though it was not rectified, it was used with success for one of the motor-lorries at the Forest Gas-Works, being mixed to the extent of 50 p.ct. with ordinary motor spirit. The yield was as stated by M. Mallet. The question of spirit production is, of course, a powerful argument in favour of the catalytic process.

4.—The gas, which in this case is only a bye-product—spirit being the main one—can be sold at a price lower than the cost price of rich gas produced in the manufacture of carburetted water gas.

These various statements show the value of the process from an industrial point of view. It is true, however, that it does not, properly speaking, belong to the gas industry, as this does not usually involve the manufacture or sale of spirit.

As regards the gas, it must be pointed out that it can usefully take the place of compressed gas, acetylene, &c., for the lighting of railway carriages, of buoys, or for various industrial purposes. New openings might thus be found for it. Finally, in order to reduce the cost price, it might be more profitable to collect on one site plant capable of supplying several gas-works, so long as they were situated in the same area.

It is difficult to say yet what saving can be effected by the use of the catalytic process; but, even admitting the economy to be so small as to be negligible, it is evident that a gas-works buying catalytic gas will benefit in the following ways:

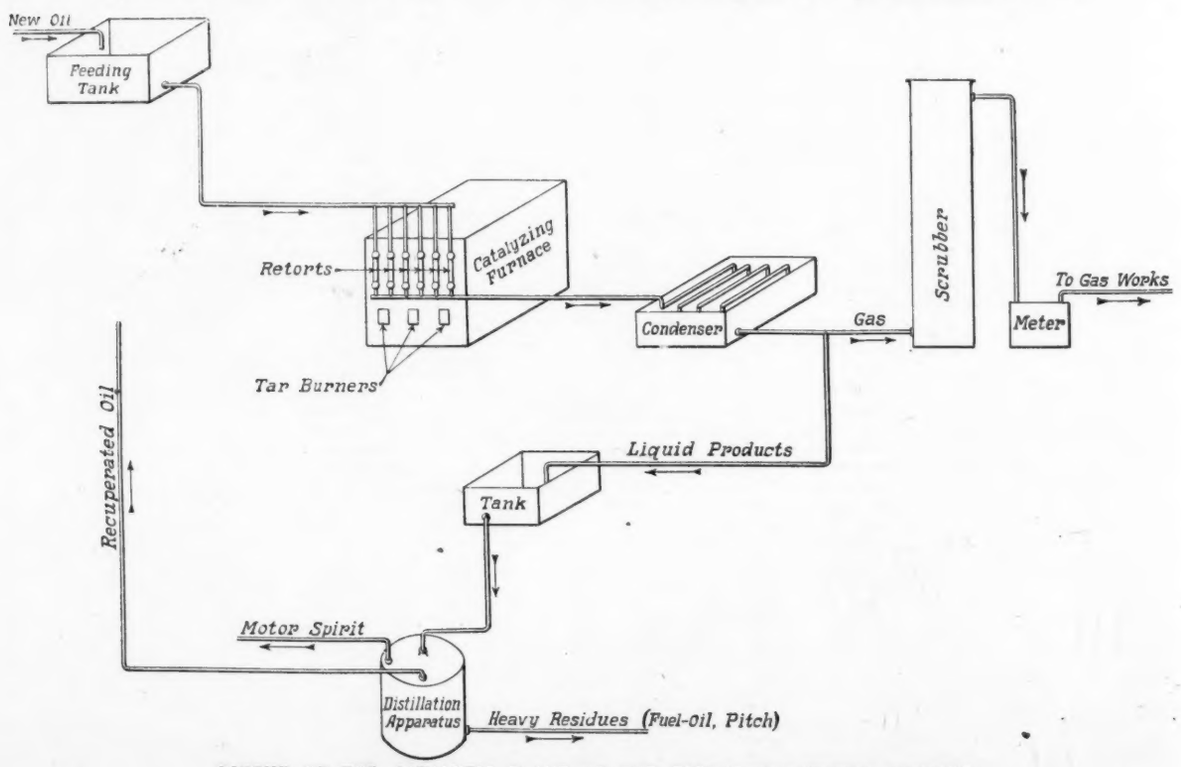
(*a*) By the simplification of the working, owing to the discontinuance of the use of gas oil.

(*b*) By better control over the working in general, and especially over the quality of the gas produced.

(*c*) By suppression of oil tanks, tar cisterns, pipes, pumps, &c., and economy on the upkeep of same.

These advantages deserve serious consideration; but further tests on a larger scale will be necessary to show whether the anticipated economies are realized in actual practice.

* See "JOURNAL," Vol. CLIX., p. 475.



SCHEME OF THE CATALYTIC PLANT AT THE FOREST GAS-WORKS, BRUSSELS.

SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

Additional General Meeting at Exeter—Thursday, Sept. 28.

THE principal feature associated with the additional general meeting of the Southern Association of Gas Engineers and Managers, held at Exeter last Thursday, was a discussion opened by Mr. G. M. Gill, M.I.M.E., of London, on "The Best Quality of Gas to Declare under the Gas Regulation Act, 1920, having regard to the Interests of the Supplier and the User." The subject was productive of a very interesting and instructive discussion. The President (Mr. J. M. Campbell, of Margate) occupied the chair, and was supported by the Vice-President (Mr. P. S. Hoyte, of Plymouth), the Hon. Secretary and Treasurer (Mr. W. H. Bennett, of Redhill), and Mr. Gill. There was a representative attendance of members.

THE LUNCHEON.

Prior to the general meeting, luncheon was served at the Rougemont Hotel, the PRESIDENT presiding. In the course of a short toast list, tributes were paid by the President to Mr. W. N. Westlake (Secretary and Manager of the Exeter Gas Company) and the Directors of the Exeter Gas Company. Since the Western District had been formed, the services rendered by the Exeter Gas Company were deserving of some recognition; and the Association were very proud to have with them that day Mr. G. Hardy Harris, as well as other Directors of the Company. On behalf of the Association, he wished the Company every possible prosperity. [Applause.] They also thanked Mrs. Westlake for her kindness in taking the lady members round Exeter, and showing them the various objects of interest in the ancient city.

Mr. HARDY HARRIS, in acknowledging the compliments on behalf of his brother Directors, said it had been a great pleasure to do anything that could assist the deliberations—and the results brought about by those deliberations—of such an Association. In these times of keen competition, world-wide progress, and invention—however good boards of directors might be—they were dependent upon the brains of those gentlemen for the progress and maintenance of the prosperity of the gas industry in the future. They appreciated that it was a great advantage to meet together and discuss matters.

THE BUSINESS MEETING.

The following were elected new members, on the proposition of the PRESIDENT, seconded by Mr. J. WESLEY WHIMSTER, of Bath: Mr. George Robert Anderson, A.M.Inst.C.E., B.Sc. (Eng.), (Gas Light and Coke Company, Nine Elms); Mr. Francis Alfred Baily (South Metropolitan Gas Company); Mr. John Shelley Cowdrey (Oxted); Mr. Albert Edward Cutler (Enfield); Mr. George Ellis Carpenter, M.C. (Budleigh Salterton); Mr. David Henry Davies (Herne Bay); Mr. Lionel Richard Fender (Henley-on-Thames); Mr. Henry Garnon (Exeter); Mr. John Giles (Sandwich); Mr. John William Halstead (Horsham); Mr. John Beardsmore-Hyde (Hawkhurst); Mr. Harry Carlton Page (Canterbury); Mr. Conrad Thomas Price (Hampton Wick); Mr. James Frederick Tyndall (Deal).

Mr. G. M. GILL (London) then opened a general discussion, on the subject of

THE BEST QUALITY OF GAS TO DECLARE UNDER THE GAS REGULATION ACT, 1920, HAVING REGARD TO THE INTERESTS OF THE SUPPLIER AND THE USER.

The Gas Regulation Act, 1920, forms the starting-point upon which the discussion this afternoon is based. As is well known to all present, the Act in question is of the greatest possible importance, not only to gas undertakings, but also to the public. The public, however, are not likely to grasp for some time to come the value of the Act in the protection that it gives them, provided always that the Act is administered in an efficient manner.

The outcry against the new method of charging "per therm," instead of "per 1000 c.ft.," was, in the view of the speaker, inevitable; and the new system has given a discontented minority an opportunity of condemning the gas undertakings. But this criticism, fostered by certain newspapers, will, of course, have no effect in preventing the general adoption of the therm system, which undoubtedly has come to stay.

It is perfectly clear that all gas undertakings which have not yet obtained an Order under the Act will have to do so in the future, while, as provided in the Act, the Board of Trade may now—it being two years since the passing of the Act—take the initiative and put it in force in the case of any undertaking. Its operation will undoubtedly result in a general improvement in the uniformity of the quality of gas supplied and in the pressure at which it is distributed. The obligations of the Act in relation to quality, pressure, and purity will, in the opinion of the speaker, be an advantage rather than a disadvantage to gas undertakings.

The settlement of the actual calorific power to declare is to all undertakings a matter of paramount importance, and will have a substantial bearing upon the future prosperity of the undertakings. How, then, is this figure to be determined? The quality of gas decided upon must be that best suited to the consumers and their appliances, and be such as may be produced and sold at the lowest price per therm; and, further, it must be sufficiently concentrated to enable the undertaking to deliver the quantity of therms required by consumers at times of maximum demand at the most remote points of its district.

What, therefore, is the best figure to declare? The speaker would suggest that the best for a first declaration, in the great majority of cases, is the quality to which the consumers have become accustomed. Time enough to alter it after working under the Act has provided the necessary experience to test the correctness or otherwise of the quality declared. In the future—and possibly in the near future—experience of the new system may clearly point to the advisability of making a change, and certainly frequent consideration in regard to taking such a step should be given to this matter.

The determination of what is the best quality for use in the consumers' appliances on any particular district requires the assistance of the "district" man, who spends, or should spend, a large amount of his time investigating and analyzing the complaints of the consumers. At the same time, careful consideration should be given to the results of the scientific observations made by Prof. Cobb and his assistants at Leeds University. The consumer requires sufficient therms in a given time at the requisite pressure and uniformity of quality to provide him with a good service. Such service can undoubtedly be given by gas within a wide range of heating value, so long as the other stated requirements are carried out. Whatever the quality declared, there is no alternative, if the service is to be a good one, to the absolute necessity of adjusting all the consumers' appliances to such quality. This obligation should not be shirked, and such expenditure should prove profitable in the long run.

While there cannot be said to be any general solution to the problem of what grade of gas to declare, there is a comparatively simple solution to the problem in the case of most individual undertakings. All it requires is a reasoned investigation on both works and district. The nature of the district to be supplied, and of the plant and raw material to be used, will frequently give a ready answer to the question. Both high and low grade gas have advantages under certain conditions. High-grade gas takes full advantage of the capacity of the plant from retort-house to consumers' burner. Nearly all gas plant, whether manufacturing or distributing, has to be large enough to deal with a given volume of gas, quite irrespective of quality. A gasholder, if used for storing 500 B.Th.U. gas, is worth 25 p.ct. more than it would be were it used for storing 400 B.Th.U. gas; and this is only illustrative of the extent to which the capital value of existing plant can be depreciated by lowering the quality of gas supplied. One of the greatest difficulties of modern gas distribution is the necessity of supplying a large quantity of therms in some remote parts of a district in a very short time on Sundays during the mid-day cooking hours. It is therms that are then required, and the volume of gas to be supplied is obviously greatly reduced if the gas is relatively rich in heat units. This advantage of high-grade gas is bound to settle, for the present at any rate, the quality of gas to be supplied in many districts.

A study of the type of plant used in the southern district of England discloses the fact that considerably over half the undertakings supply coal gas only made in horizontal retorts. If coal-gas plant only be used, except where steaming in verticals is practised, the quality of gas must of necessity be fairly high, unless too great a use is made of the exhauster, which practice, in the speaker's opinion, is always a bad one and uneconomical from the point of view of making cheap therms. Where horizontal or inclined retorts are employed, the fixing of the calorific power should be a comparatively simple matter, as the plant, if worked properly, will not, with almost any variety of coal, make gas of low calorific power of (say) under 525 B.Th.U., nor will it economically make gas of very high calorific power of (say) over 575 B.Th.U. The speaker is confident that, where the coal gas is being made outside this range, the thermal yield obtained per ton of coal is being thereby sacrificed, and financial loss is resulting.

There is no satisfactory means of diluting coal gas made in horizontal and inclined retorts. The worst method of all is to draw in air at the retort mouthpieces. This results in much good gas being burnt in the ascension pipes, while the air not so consumed, should it be more than is required for purification purposes, passes forward with the gas and damages holders, mains, and services, causing the formation of rust to an extent which cannot be estimated. To draw in waste gases through holes in the retorts, though less harmful than drawing in air, is objectionable, and cannot be regulated. As a consequence coal gas so diluted varies in quality to a greater extent than is economical, or permissible under the Gas Regulation Act. In making coal gas more therms per ton and per retort can be produced where holes in retorts and leaks in mouthpieces and fittings are, so far as practicable, absent. A leak *in* means a leak *out*. The admission of waste gases involves the emission of coal gas—a bad exchange. If coal gas made in horizontals or inclines has to be diluted (and the wisdom of doing so is very questionable), this should be done, not by over-pulling or by the admission of air, but with good quality water gas or producer gas in regulatable quantities.

If a mixed gas be supplied, there appears to be a distinct tendency to declare a somewhat low calorific value, with the probable object of using as little oil as possible. Thus, when the percentage of water gas is low, no oil is used; but as the percentage is increased, so must oil be used to maintain the calorific power of the mixture. If coal gas be taken at 550 B.Th.U. and blue water gas at 300 B.Th.U., it is possible to increase the percentage of blue water gas in the mixture to 40 p.ct. by volume before the calorific value of the mixed gas falls below 450 B.Th.U., which shows that very little oil is required with a declaration of 450 B.Th.U. But if one gallon of oil be used per 1000 c.ft. of the water gas, then the quality of the water gas is raised from 300 to 400 B.Th.U., and the calorific power of a mixture of 60 p.ct. coal gas and 40 p.ct. water gas is increased from 450 to 490 B.Th.U.

It depends on the cost of oil whether this is or is not the cheapest method, where a water-gas plant is used, of producing therms. If the manufacturing cost of making one therm of coal or blue gas is 6d., and the cost of oil is 5d. per gallon, then it is cheaper to use the oil, as one gallon of oil produces one therm of gas. If, again, oil becomes cheap—and at one time before the war it was costing no more than 1½d. per gallon—its value for making cheap therms would have to be seriously considered by all gas makers.

In supplying a mixed gas in the future, much more consideration will undoubtedly have to be given to maintain the quality and general characteristics of the mixed gas at a more uniform standard. Otherwise, a mixed gas cannot be said to compare with an undiluted coal gas in its ability to give satisfaction to the consumer.

If an undertaking is to be prosperous, it cannot afford to vary the percentage of water gas from 10 p.ct. to 60 p.ct., or anything like it. The resulting change in specific gravity alone is quite sufficient to upset a consumer's appliances and his temper. The use of water gas is undoubtedly a blessing to some undertakings under certain conditions, but becomes a curse if abused.

For these reasons the speaker considers that where a mixed gas is supplied, the water-gas plant should only be used for providing a proportion of the mixed gas required within a comparatively narrow range of percentage of the moisture. Water gas is frequently of the greatest value. When capital outlay is a difficulty, when there are coal and labour strikes and prospects of strikes, when coke disposal and storage is a serious trouble, and when the works are congested, and liquor of no value, a manager's thoughts naturally turn to water gas, and he can often, with advantage, instal a plant; but the plant should always be a servant and not a master. He should keep in view at all times its proper use, so as to do nothing to reduce the service given to the public. We are told in the scriptures that it is more difficult for a rich man to enter into the kingdom of heaven; and similarly it is more difficult for the owner of a water-gas plant to keep in the straight path.

High-grade gas has an advantage in its ability to give a usable light in a flat-flame burner; and this is an advantage, in spite of all that may be said to the contrary. An up-to-date firm of engineers in London quite recently fitted-up a new machine shop, in which every machine was provided with a movable flat-flame burner. For small lights, in places occasionally used only, a flat-flame burner is the most suitable of all lights. It is not for a moment suggested that for this reason only high-grade should be supplied; but it is an advantage which must be credited to gas of such quality.

In the speaker's own experience, a high-grade gas of about 560 B.Th.U. quality gives excellent results to consumers; but there must be plenty of pressure at the burner. Where high-grade gas has not given satisfaction, it has undoubtedly been due to insufficient pressure at the burner-head, or to the supply of a variable quality. Satisfactory business conditions demand a good pressure at the burner. With high-grade gas insufficiency of pressure will result in poor efficiency and wasteful consumption. With such gas the burner has much work to do as an injector to draw in sufficient air for complete combustion, and for this work a good pressure is required. In this respect there is an advantage in low-grade gas; much less pressure, though greater volume of gas, being requisite to give a good result. The pressure required at the burner-head can be reduced when low-grade gas is being supplied in a much greater ratio than the reduction in the quality of gas. As richer gas is supplied to the burner, the pressure at the burner-head has to be increased to an extent quite out of proportion to the increase in quality.

Mr. George Helps has demonstrated that ½ in. of pressure at the burner-head with 350 B.Th.U. gas is sufficient to give an excellent result in an inverted burner; and this is a great advantage in certain circumstances, though obviously the orifice through which the gas is passing must be large enough to supply the required amount of therms at so low a pressure. Adjustment of appliances, or, better still, specially designed appliances, are of course highly desirable if a great change is made in the nature of the gas supplied. Mr. George Helps has further demonstrated that with low-grade gas the material or object to be heated can be brought very close to the flame; and anyone who knows anything of heat transmission is aware that the closer the object to be heated can be brought to the source of the heat, so much the higher is the efficiency of the result.

There is no doubt that if the future shows that therms can be made substantially cheaper when producing gas of a low quality, then the whole question of distributing such therms and adapting appliances to using them efficiently will have to be seriously considered by all gas suppliers. There are several workers experimenting in this direction, and undoubtedly much more light will be thrown on this question in the near future. Most engineers are content to declare, make, and supply a quality of gas which experience has taught them is as near as possible to the happy medium in the circumstances of their own undertaking; and this course is certainly a wise one at the present juncture, while closely watching developments.

The remarks so far made have referred to undertakings which have full information of the quality of gas which they have been and are supplying; but there may be some undertakings which have in the past relied upon jet photometers to regulate the quality of gas made, and where no precise information of the heating value of the gas is known. In such cases nothing but a series of tests carried out over a period will give the requisite particulars upon which to base a declaration. It is a great mistake to allow chance to play any part in so important a matter. This is mentioned, as a study of the declarations already made disclose some which are manifestly disadvantageous to the undertakings in question.

Time will not permit of the discussion of the important subject of the best methods to employ on the works in conforming to the obligations of the Act, though the speaker, in the first instance, intended to deal briefly with this aspect of the question. It may, however, be stated that ease in maintaining the necessary uniformity in the quality of gas under the Gas Regulation Act, and at the narrowest margin over the declared quality, will depend upon the condition of the plant, the manner in which it is operated, and the system of testing in the works.

In conclusion, the speaker would suggest that at some future meeting the members should be given an opportunity of discussing the best methods of working under the Act. Experience in such matters is daily accumulating, and it would undoubtedly be to the advantage of the members generally to have as much light as possible thrown upon this important subject.

Mr. A. W. Sumner (Grays, Essex), in a written communication, said: What is the best quality gas to declare under the Gas Regulation Act, 1920, having regard to the interest of the supplier and user? The question under consideration is a very important one for the gas industry, and one which some of us have, for the time being at any rate, had to answer. I am afraid, however, that it will be a long time before there is anything like general agreement on the matter, and certainly not until we are prepared to go very carefully into the question for ourselves.

If I might be allowed to say so, I think there is too much "Follow the leader" in the gas industry, and not sufficient "Individuality." The first means stagnation; and the second, progress. I sincerely hope that the result of the discussion will at least result in an earnest endeavour to arrive at a right and proper solution.

When I was called upon to answer this question for my Company, I decided that a gas of 400 B.Th.U. was the proper gas to supply. In making this decision, I naturally took into account the plant which I had at my disposal as compared with the demand for gas by the consumers.

Such gas is at present called low-grade gas. Personally, I object to the term, and would be grateful to anyone who could more properly describe it, as that term naturally makes both manufacturer and consumer look sceptically at the product. I submit that the value of gas is not so much dependent upon the B.Th.U. supplied as it is upon the composition.

I am not prepared to argue this from the point of view of the expert chemist, but I do so from my observations and experience. For instance, a 400 B.Th.U. gas made from coal gas, *plus* overpulling, will not bear comparison with, or give the results of, a 400 B.Th.U. gas made from a proper mixture of coal gas and blue gas with low inerts.

This is the first point that leads me to fall-out with the conditions contained in the Gas Regulation Act—namely, that the price to be charged for gas must be on the basis of the number of B.Th.U. contained in a cubic foot. I claim that with a 400 B.Th.U. gas of proper mixture I can obtain equal, if not better, results, and give as good service to my consumers as any other company supplying a gas of 500 B.Th.U.; but in my case it is necessary to use a multiple of 4—*i.e.*, 4 therms to the 1000 c.ft.—when they may use the multiple of 5.

I am of opinion that the question under consideration has been and will be answered in the future on the basis that the higher the B.Th.U. supplied the higher the standard, and hence the larger the dividend, without consideration of the fact that a lower-grade gas would render as good service to the consumer. If the Gas Regulation Act operated reversely—*i.e.*, the lower the standard the higher the dividend—I feel sure that those supplying so-called low-grade gas would have many more followers.

The plant available at Grays consists of—one 500,000 c.ft. set of Glover-West verticals; one 400,000 c.ft. Humphreys & Glasgow C.W.G. plant, and one 240,000 plant of the same make. The quantity of gas made per annum is about 225 millions. By steaming the verticals, I can produce per ton of coal between 16,000 and 16,500 c.ft. of approximately 435 B.Th.U., to which can be added blue or carburetted water gas as desired, to maintain quality and quantity. As you will see, such plant is very well suited for the manufacture of low-grade gas, if desired; and in so far as my own Company are concerned, I think there is little doubt that the adoption of a low standard was the correct one. I would like to add here that similar results could be obtained by any company having any form of coal-gas plant *plus* C.W.G. plant; and I will go so far as to suggest that any company without a water-gas plant should endeavour to correct that fault without undue delay.

Now as regards the latter part of the question—as to the best quality of gas for the consumer. I would say that with a 400 B.Th.U. gas—

1. The consumer is not called upon to use more gas on account of the standard selected.	As evidenced by the meter.
2. The lighting without doubt is better.	From observation, absence of complaints, and no carbon deposit.
3. Cooking is more satisfactory.	As a flame nearer perfect combustion is obtained, excess of B.Th.U. not supplied, and absence of smell.
4. Power results are more satisfactory.	The evidence of Sir Dugald Clerk should be sufficient.
5. Gas fires, geysers, coppers, circulators, &c., function well.	Excellent results.

The statement concerning the reduced carrying capacity of the mains is a bogey, as is also that lower-grade gas requires more pressure.

For the first part, if the gas engineer will take the trouble to find out what percentage of inerts his mains are carrying (and I venture to suggest that many will find these may be quite 25 p.ct.), and reduce these to (say) 12 p.ct. to 15 p.ct. (a simple proposition, for overpulling at the exhauster could never be justified), they will more than make up for any slight loss in the carrying capacity of the mains.

As regards the second, the fact is overlooked that when supplying a low-grade gas a larger gas-nipple is required, and also less air to complete combustion; hence, only a lower pressure is necessary for satisfactory results.

What are the real advantages of supplying a high-grade gas of 450 to 550 B.Th U.?

For the Producer.	*For the Consumer.*
1. The increased value of the standard rate.	None.
2. The lower cost of production per therm (?)	

DISADVANTAGES OF HIGH-GRADE GAS.

Producer.	*Consumer.*
More coal-gas plant.	Gas too rich for him to obtain best efficiency.
More tonnage to handle.	
Value of residuals influenced.	
Waste of the country's greatest asset (coal).	

ADVANTAGES OF LOW-GRADE 400 B.TH.U.

Producer.	*Consumer.*
Less coal-gas plant.	Better all-round service.
Less tonnage to handle.	
Fewer complaints.	
Better control over residuals market.	
Less labour.	
Saving of country's greatest asset.	

DISADVANTAGES OF LOW-GRADE GAS.

For the Producer.	*For the Consumer.*
Lowers value of standard price.	None.

As I am particularly anxious not to be misunderstood, let me say definitely that when I speak of low-grade gas I do not refer to any gas under a 400 B.Th.U. standard. I consider any gas over 425 B.Th.U. to come into the region of high-grade gas.

The above question is most interesting and fascinating, and it is difficult with such limited experience at this stage to say anything like the "last word" on the subject. I therefore claim an Englishman's privilege to alter my mind, should the exigencies of the times so dictate.

One member observed that 400 B.Th.U. did not seem to be enough, but another speaker said he had been down to 330 B.Th.U.

The question of the price per therm was raised by other members.

Mr. SUMNER replied that this was the only question he was afraid of, because it was not easy to get comparative figures. There were so many things that counted. He happened to have a lot of mains and few consumers—the majority slot consumers. Answering a question as to the price he charged, Mr. Sumner replied 17·5d. per therm.

Mr. J. H. CORNISH (Bridgwater) stated that in his case he had declared a calorific value of 450 B.Th.U., and his difficulty had been, since he had got a better supply of coal, that they had been producing gas of about 475. Naturally, he wanted to get paid; but since the correspondence on the subject in the leading London papers, it had been rather difficult to convince a body of directors that it was possible to raise the calorific value, for it had to be pointed out that not only the calorific value was raised, but the price also by the same operation. He could not reduce his calorific value below 475. The only thing he could do was to use inferior coal. This he declined to do, for the sake of his own peace of mind. They did supply gas for a time at about 400, but it did not give satisfaction because of the difficulty of distribution—the apparatus not suiting such composition. For everything above 450 he thought they had given absolute satisfaction throughout the district. Therefore, he was inclined to disagree with Mr. Sumner. A value of 400 might be suitable in his case, but it would not do in his (the speaker's). Something between 450 and 480 was the best gas they could supply.

The PRESIDENT: Had you prolonged experience with your 400 gas?

Mr. CORNISH: Only during the war. He added that they had made the whole supply from various vertical retorts since 1913. This gave some idea of the gas they were making.

Mr. L. TREWBY (North Middlesex Gas Company) said the stove manufacturers seemed to have made up their minds what the quality of the gas should be. He thought the best gas in his district was 450—that was with 60 p.ct. of water gas and 40 p.ct. of coal gas. The raising of the calorific value above this gave worse results. If they were going to raise their quality above what the cooker would burn, they were going to penalize their consumers considerably; the reason being that they had brought the burner up nearer to the utensils, whereas with the old cooker they had a large space between the utensils and the burner which would burn the gas made in those days.

Mr. J. W. WHIMSTER (Bath) pointed out that none of the speakers had mentioned the cost of gas. What they had to decide was what was the best and the most economical gas to supply in their own districts; and this depended on local conditions. He thought Mr. Gill was wise in not fixing any standard. He urged that the cost of manufacture, as well as the cost to the consumer, must be taken into consideration, and that depended alone upon local conditions.

Mr. CORNISH expressed an opinion that 450 gas at 1s. per therm was a much better value than 460 at the price Mr. Sumner mentioned.

The PRESIDENT reminded the meeting that the discussion concerned the quality of gas to be declared having regard to the supplier and the user. He did not think it was a question of £ *s. d.*

Mr. WHIMSTER replied that the price to the consumer had a great bearing on the question.

Mr. C. F. BOTLEY (Hastings) did not think they could consider the service to the consumer unless they considered the price to the consumer. Mr. Gill had not given enough credit to the question of coke in regard to those who used mixed gas. But that was an important factor. He did not quite understand Mr. Sumner's reference to low-grade gas having regard to the question of dividend. In these days this sort of thing might lead to a great deal of misapprehension. Recent references in the reports of gas company meetings to increased prices and higher profits were apt to give a wrong impression to people who read them and who wanted to read them in that way—that an essential feature of the therm was increased price. He hoped those who had declared calorific value would gain experience of what that calorific value was before jumping to something else. Jumping about was very disconcerting, and gave rise to antagonism concerning the thermal system. In Hastings, since they had had the mixture, they had supplied 460 and 470. With the burners he had tested, he found real efficiency was obtained with a gas of 470—a mixture, which was a different thing from straight coal gas. He had tried 460 as a minimum, although their average last year was 468. This had been absolutely satisfactory. He should now say definitely that they could not burn a 560 gas satisfactorily in an ordinary burner at the regulation pressure of 2 in. They could not get the maximum efficiency.

Mr. GILL reminded the speaker that what he had said was "good pressure."

Mr. BOTLEY (continuing) said that to get the best efficiency, they had to get the good pressure. Naturally, the thermal standard was based on the assumption that there was a direct value to the consumer of between 460 and 560. Inasmuch as they could certainly burn a 460 mixture more efficiently than they could a 560 straight coal gas, they could not get, when it came to the consumer, the same relative difference in the price. What Mr. Gill had said on general lines was sound; and the next time he should expect him to recommend everybody to instal the best coal-gas plant possible.

Mr. A. CADDICK (Croydon) said his Company happened to be one of those to increase the calorific value of their gas. Previous to the war they had a 538 B.Th.U. mixture of coal and water gas. When they were required to come down during the period of the war, they gradually fell to 425. He then increased to 460 or 470, and the latter answered very well indeed. Then the question arose as to whether they should continue thus, or increase to 500. After a great deal of time and experiment, he found that 550 coal gas gave the maximum amount of therms per ton. He decided to dilute it with 33 p ct. of carburetted water gas, and this gave about 470. He found that a little oil went a long way. He then decided to increase to 500, and was a believer in 500 gas.

Mr. R. ROBERTSON (Bristol) contended that in deciding what the calorific value should be, the main consideration must be—what was the most economical and efficient service that could be given to the consumer. In his own case, he could not go below 450 without interfering materially with the efficiency of the supply. Where he had attempted to, a moderate degree of efficiency was only obtained by giving burners proper supervision. By giving 480, they had been able to dispense with this. They were better in supplying 480 at the higher price than they would be in supplying 400 at a lower price. He was glad that the standard cooker had given them a sufficiently elastic apparatus by which it could be varied to suit their particular purposes, if they could make cheaper gas than they had been in the habit of making. They would be glad of the guidance of people who had had an opportunity of deciding on the proper basis on which they could compare water gas with straight coal gas, so as to decide which it would pay them best to make.

Mr. P. S. HOYTE (Plymouth) said there were many factors to be considered in determining what was the best quality of gas to supply. Having regard to the price of coal and oil, and certainly in regard to the actual works cost, Plymouth found it cheaper, from the points of view both of the Company and the consumers, to declare a 425 gas rather than a 450. This was when oil was somewhere in the neighbourhood of 1s. per gallon. For years past they had made 40 or 50 p.ct. oil gas. They were obliged to do it because they were not an industrial district. The price of oil fell substantially, and became less than half. They then first declared 425, but ultimately adopted 450. They were having a desperate lot of trouble with meters. Repairs ran up to double and treble what they had been accustomed to with the 425 gas. They had dropped substantially since they had adopted the 450 figure. With their declared calorific value at Plymouth at 425 and then 450, in the last five quarters there had not been one when his B.Th.U. had been more than a decimal point above the declared value. By keeping an accumulative average, they were so able to work things that they were not giving away more than the slightest fraction of a B.Th.U. He did not see how they could supply 468 when they were only paid for 450. If they were going to supply 10 B.Th.U. above the declared calorific value, it was going to cost £2000—a big sum to go into the pockets of the consumer. They had a great deal of research work to do before they could say exactly what was the best quality of gas to supply, and they had to take into account the local conditions.

Frankly, he thought cheapness combined with efficiency was wanted to-day, especially in view of the competition of electric lighting. They did want to get the price of gas down to the lowest level consistent with efficiency. If they were going to supply low-grade gas, they would have to increase their pressure. It was up to them to give their consumers the best service and the best grade of gas. When they had found out that, they would be able to give satisfaction to themselves and to the consumers.

Mr. E. J. Fottrell (General Manager of the National Gas Council) said that in the case of smaller undertakings the main or sole guide was the jet photometer. It could not be too strongly emphasized in the case of undertakings who had not made their declarations, that they should obtain definite information as to the actual calorific value at the present-time. He did not understand Mr. Sumner's statement that with one cubic foot of 400 gas he could give the same service to the consumer as with one cubic foot of 500. If that was correct, it was not a criticism of 500 or 400, but a serious criticism of the appliances in use at the present time. Freedom was the keynote of the whole Gas Regulation Act. It differed from any similar Act of legislation for a long time past. As a rule, legislation lagged behind industry. It was only when catastrophe came that public opinion was stirred-up. In the case of the Gas Regulation Act, they had gone rather ahead. The point now was that they had got a freedom—and especially a freedom for research—which had never existed before. They had got a freedom of individual research exercised primarily for the benefit of the consumer, and of putting the results of these different researches into practical effect without further legislation. This was the outstanding feature of the Act, and it was wholly ahead of what they had asked for. If they desired to carry out research work, they must have freedom; and if they decided to retain freedom, the therm must be retained.

Mr. W. N. Westlake (Exeter) said that those engineers who were fixed in their minds as to what was the correct calorific value to declare were in the minority. The discussion had served to emphasize the tremendous complexity of the question, and how many interests there were to be considered. During the war, as did other undertakings, they complied with the orders of the Government to reduce the calorific value of the gas. He determined to come down very gently and slowly, so that it would cause the consumers the least trouble. They went down gradually. No trouble arose until they got to the neighbourhood of 450 B.Th.U. Then they began to get complaints from various districts. He investigated, and it was perfectly clear that the apparatus in use then would have to be altered and adjusted if they were to supply anything below 450 B.Th.U. gas. The question was gone into, and it was found that the verticals, if they went down to 450 B.Th.U. gas, would not produce so many therms per ton as they could produce in the neighbourhood of 470 or 480; and this was what they had been supplying in Exeter. As a result of misguided public opinion, the man in the street, who had not gone into the question as they in the profession were bound to do, offered criticisms that were not justified. They would continue to probe the subject.

Mr. J. Harger Pye (Clevedon) referring to Mr. Hoyte's statements as to the average calorific value of the gas supplied during the quarter, remarked that this did not apply to the case of gas companies making 100 millions per annum or less. In such cases, the Gas Referees provided that the gas examiner should make three tests during the quarter, and that the average calorific value for the quarter should be, for the purpose of the Gas Regulation Act, the average of those three tests. This was a very important matter, and compelled gas companies of that size to declare a calorific value below which it would never fall, even in cases of unforeseen emergency, because the examiner would naturally call and test the gas immediately he noticed anything wrong. These three tests would, therefore, represent the minimum calorific value, and would invariably be below the average value supplied during the quarter. It was no good regulating the calorific value supplied towards the end of the quarter so as to level-up the average to the declared value, because it would not count for the average unless it happened to be included in one of the three tests made during the quarter. This was why he recommended for small companies a wide margin between the declared and the actual calorific value supplied.

Mr. C. C. Chambers (Harrow) urged the importance of declaring the calorific value which undertakings had been in the habit of supplying. He did not think they should lightly exercise the freedom to change the calorific value they had declared.

Mr. A. Thomas (Burnham) thought all coal-gas companies should have a water-gas plant.

Mr. C. H. Rutter (Brighton) said they started with 470 B.Th.U., and now worked with 500. At Brighton they had always tried to make 70 therms per ton.

The President, in proposing a vote of thanks to Mr. Gill, said he was one of the few men who could deal with the subject satisfactorily and thoroughly.

The Vice-President, in seconding, said the discussion would give them considerable food for thought. There were so many points bound up with it, and there had to be borne in mind the Press agitation on the question of the charge per therm. There was no doubt that there was some justification for some criticism in the minds of consumers about the charges. He would not say it was A.B.C. to every man in the gas industry. Mr. Hoyte suggested that accounts might profitably be sent out showing charges both per thousand cubic feet and per therm.

The proposition having been carried by acclamation,

Mr. Gill, in his reply, expressed satisfaction with the discussion. He said that it would take time to clear away the doubts in many minds in regard to the best calorific power to declare, and that this time next year much that was obscure at the moment would be cleared up. Mr. Sumner had claimed many advantages for low-grade gas. Many gas engineers to-day were thinking that there was something in low-grade gas; but they would not be convinced until they could see an undertaking giving a good service with a low-grade gas at a cheap price. It really needed such a demonstration before the cautious spirits in the industry would be inclined to associate themselves with the supply of such gas. Mr. Botley and one or two other speakers appeared to attach the greatest importance to the use of as much coke as possible for gas-making purposes, in preference to selling it. He (the speaker) had experience in selling coke in London some years ago; and he then came to the conclusion that coke could be very readily sold for steam-raising—and every district had boilers—in competition with coal, provided that the seller was willing to demonstrate in a practical manner how the coke should be burnt. If used correctly (which is never the case where the user is left to his own devices) one B.Th.U. in the form of coke will raise more steam than one B.Th.U. in the form of coal. Mr. Botley discussed some of the difficulties in regard to giving the requisite pressure when supplying a high-grade gas. In reply he would say that, in his opinion, the giving of a good pressure throughout a district was a very effective way of selling more gas, while at the same time satisfying the consumers. From a business getting point of view, the supply at a good pressure was all important. He knew of no better way of regulating such pressure than that adopted in South London many years ago, in which 24-hour pressure recorders were connected to the mains at all important parts, thus supplying the information required for regulating the pressures at the works. He agreed with Mr. Hoyte that it should not be necessary to keep a large margin over the declared value. If a cumulative average is made of the tests day by day, it is possible to correct any rise or fall in such average by making the gas a little higher or a little lower in calorific power until such discrepancy is corrected. This, however, would be a difficulty (as Mr. Pye pointed out) in a small undertaking where only two or three official tests were made during the whole quarter. Careful and regular testing to guide the regulation of the quality would appear to be the only solution to the difficulty of supplying gas close to the declared value. He thanked the President and Mr. Hoyte for the kind remarks which they made in proposing and seconding the vote of thanks for his paper. For his part he could only say that it was always a pleasure to be of any service to the Association.

A request was made by the British Commercial Gas Association that Mr. Walker should be allowed to address the meeting with regard to a salesman's conference. The request was acceded to; and it was agreed to include the subject in the agenda for the November meeting of the Western District.

On the motion of Mr. R. Beynon (Torquay), seconded by Mr. R. Robertson (Bristol), a very hearty vote of thanks was accorded to the President.

Visit to Messrs. Willey & Co.'s Works.

At the invitation of the Chairman and Directors of Messrs. Willey & Co., of Exeter, many members took the opportunity of visiting the firm's works, which proved very interesting. They have had a long association with gas engineering, particularly in the West and South-West of England—having commenced business in the early sixties. Considerable extensions have been found necessary from time to time to cope with increased business. The original works of the firm were situated in Commercial Road; but these having proved altogether inadequate for the growing trade, new works and offices were erected in Haven Road, consisting of up-to-date buildings fitted with modern machinery, and giving employment to between 600 and 700 skilled mechanics.

The meter department is a spacious and excellently equipped building, with every modern appliance for the manufacture of all kinds of meters, gas test-holders, street lanterns, and other gas appliances. Large numbers of ordinary and automatic meters were seen in course of construction. The Company's latest type of automatic meter is a very simple and efficient article; and this meter has been utilized in a smaller form as a gas-fire meter—a boon to hotel and boarding-house proprietors.

The manufacture of meter indices, automatic attachments, &c., was inspected in the meter brass department. A large number of special automatic and semi-automatic special machines were seen working, producing the various parts to very fine limits, ensuring the work being absolutely accurate and interchangeable.

With regard to the brass and burner department, this is also well-equipped; and it is noteworthy that the articles turned out are of the finest materials and workmanship. A special feature with the firm is that all fittings—pendants, brackets, &c.—are made from the best solid-drawn tubing, no brazed tubing being used by them in the manufacture of any of their fittings.

The members were also much interested in seeing special machinery tools, dies, &c., of all types in course of construction in the well-equipped tool department.

In the heavy machine shop there was a particularly fine double T-piece 48 in. in section by 9 ft. 9 in. long being machined. This casting weighs 3 tons. In the same shop there were a number of large castings being machined for purifiers, valves, &c.

Particular interest was shown in a new valve for reversing the flow of gas in purifiers. This valve is 24 in. in diameter, quite simple in construction, and so arranged that the changing-over takes only about one minute in operation. There are a number of these valves in use, and an even greater quantity on order. Purifier plates were being machined on the flanges by a double-headed milling machine, machining two flanges simultaneously. By this means accuracy is ensured, and the plates are also finished dead square.

In the construction yard there were some large roof principals 70 ft. span, a gasholder having its crown fitted into position, purifier covers being assembled, and a quantity of steel stancheons and lattice girders being riveted together by hydraulic and pneumatic machinery.

The iron foundry presented a busy scene. This is the largest foundry in the West of England; and the members were shown small castings from one ounce in weight being made which are used in gas-cookers, and also saw the iron poured into the mould for a large syphon weighing about 2 tons. The ladle containing the molten metal was conveyed from the cupola to the mould by means of an overhead electric travelling crane, which is capable of lifting 10 tons.

It is interesting to note that in 1918 a Cadet Corps was formed by Messrs. Willey & Co.; the cadets being uniformed and equipped at

the firm's expense. They have also a bugle band of 25. The lads are given facilities for attending camp each year. They are encouraged in sports of all kinds, and at present hold three cups—namely, the "Football Express" cup, a shooting cup, and band contest cup. In addition, they were in the semi-final of the Devon Junior Cup.

Messrs. Willey & Co. have also large meter factories in London, Leicester, and Manchester.

Visit to Dartmoor.

The members and their ladies, to the number of about 45, took a trip over Dartmoor, proceeding direct to Haytor Rocks, which is about 1400 ft. above the sea level. The weather was ideal. Excellent views were obtained of the surrounding country and the English Channel at Teignmouth and Torbay. Immediately after lunch at the Moorland Hotel, the journey was continued towards Princetown *via* Two Bridges, returning through the heart of the Moor to Moretonhampstead and thence on to Exeter. Dartmoor is at its best at this time of the year; the heather and gorse colouring and foliage being much admired. In every way the party spent a most enjoyable day.

IGNITION TEMPERATURES OF COKE.

In view of the fact that the suitability of a particular coke for a special purpose often depends upon whether it is readily ignited or otherwise, Prof. Dr. Bunte and A. Kölmel undertook some research work into the question at the Karlsruhe Gas Institute, the results of which, published in "Das Gas- und Wasserfach," may be summarized as follows.

In the case of solid fuels, no exact and definite temperature can be determined at which ignition takes place. The method described, however, enables handy measurements to be made for comparison of one fuel with another, and it shows that the variation in ignition temperatures is surprisingly great. The simple apparatus used consisted of a vertical electric oven, in which the coke was slowly heated-up in a regular stream of air preheated to the prevailing oven temperature. For this purpose, the lower part of the tube was filled with broken fireclay, above which the coke was placed, in pieces of ascertained size, and separated off by wire gauze. A thermo-couple, protected by a quartz-glass tube, was suspended in the coke to within two or three millimetres of the bottom of the column. This showed the rise in temperature in the oven, and it was found that at the moment when the ignition of the coke begins—that is to say, when the heat of combustion is added to the even heating of the oven—there takes place a very marked jump in the temperature.

In the initial experiment the size of coke used was 3 to 5 mm. Air was passed at the rate of 15 litres per hour, and, in a quartz-glass tube of 18 mm. diameter, the ignition temperatures determined were for wood charcoal 252° C., for "semi-coke" (low-temperature carbonization) 395° C., for gas coke 505° C., and for coke-oven coke 640° C. The coke produced by the continuous ovens of the Dresden Gas-Works gave 530°. A variation of the rate of flow of the air showed that, with increased quantities, the ignition temperature was gradually lowered. Thus, in the case of the gas coke:

Air flow litres/hour . .	10 ..	15 ..	20 ..	40 ..	50
Ignition temperature . .	515°C. ..	505° ..	483° ..	457° ..	442°

This result led to an examination of the influence of the oxygen concentration; and the following results were obtained in the case of the gas-coke and coke-oven product:

Air.	(21 P.Ct. O_2).	45 P.Ct. O_2.	100 P.Ct. O_2.
Gas coke	505° C.	428°	390°
Coke-oven	590°	—	540°

The accuracy of the method was demonstrated by the agreement of the results of tests repeated several times. To what extent the ignition temperature is affected by the size of the coke is shown by a table, from which the following values are taken:

Size.	0·5 to 1 mm.	1 to 3 mm.	3 to 5 mm.
Gas coke	477° C.	492°	505°
Coke-oven	590°	612°	640°

The analyses and characteristics of the gas and coke-oven cokes used were as follows:

—	P.Ct. of Total.		P.Ct. of Pure Coke.				
	Ash.	Moisture.	C.	H.	N.	S.	O.
Gas coke	17·06	3·17	95·71	1·13	1·43	0·78	0·95
Coke-oven	10·36	0·79	96·94	1·21	1·21	0·68	0·52

—	Real S.G.	Apparent S.G.	Porosity Vol.	Volatile.	
				P.Ct. H.	P.Ct. C.
Gas coke. . . .	1·84	1·10	40·2	0·20	1·35
Coke-oven . . .	1·91	1·10	42·5	0·08	0·60

These characteristics, taken in conjunction with those of the wood charcoal and other materials tested, which are published in the original article, show that there is no traceable relation between ignition temperature and volume of porosity, which might easily have been expected. On the other hand, it must be remembered that equal porosity can occur with small cells and thin dividing walls or with large cells and thick divisions. The fact that the ignition temperature was found to depend to a large extent upon oxygen concentration and upon size of coke, goes to show that those characteristics are of most influence which are connected with the degree of fineness of division of the coke substance—for instance, the surface adsorption. An apparent connection between volatile constituents and ignition temperature could not be traced to any determining characteristic. This was proved by the case of the low-temperature carbonization coke, which was subjected to a stream of nitrogen for two hours at 800° C. to remove any traces of gas it might contain. Its ignition temperature was scarcely altered. The method of carbonization (mainly, perhaps, the speed) appears to be an important factor, and further research is promised.

Samples were available of the coal from which the gas coke had been made (in inclined retorts at an internal temperature of 1150° C.), and laboratory samples of coke were produced for comparison by the crucible method and by Bauer's process, which consists in coking finely-powdered coal in a closed tube. The former is a more inflated coke, and the latter more compact than retort coke. Their respective ignition temperatures were 475° C. and 520° C., as compared with the 505° C. found for the commercial sample. Further experiments have been started, as, for example, with coke samples taken from different sections of the same charge, and results (when published) may throw further light on the whole subject.

Summarizing their findings so far, the authors consider their work has shown that ignition temperatures for coking products can be determined in a way that gives easily comparable results which can be reproduced with a negligible margin of error. For the same material, the ignition temperature is dependent upon the size of pieces, and upon the oxygen concentration, or its combustion density on the coke. For various materials, a fairly wide range of ignition points was found, and, even if no definite relation was established between them and determinable characteristics of the coke, at any rate the experiments have shown that each material has its own characteristic ignition temperature, which can be determined with at least sufficient accuracy for comparative purposes.

With reference to the producer process, it was considered to be of interest to test whether, for the reaction $C + CO_2 = 2CO$, a temperature point characteristic for each coke could be found at which the reaction sets in suddenly with a certain rapidity, and below which it is more or less inert. The beginning of the carbon dioxide reduction was observed quantitatively with all the coking products in question between 350° C. and 400° C. by means of palladium paper. But no sudden increase to any marked extent at any particular temperature was noted. This, it is claimed, bears out the authors' previous contention that, in connection with ignition temperatures, there is no question of tension phenomena or degree of carbonization, but much more probably the determining factor is the varying capacity for reaction depending upon the varying degrees of fineness of division of the carbon matter, and possibly in this way heat conductivity plays a part.

Scottish Junior Gas Association (Eastern District).—The opening meeting of the Association will be held in Fairley's Restaurant, Leith Street, Edinburgh, next Saturday afternoon, when the President (Mr. W. A. Dearden) will deliver his address. In an endeavour to develop the social side of the Association's activities, the Council have, as an experiment, arranged for this meeting to be followed by tea and a smoking concert.

Birmingham University and Oil Engineering.—A new development at the University of Birmingham is the division of the Chair of Mining (which was held by Sir John Cadman) into two professorial chairs. One professor will be concerned with coal and metal mining, and the other will be wholly engaged with the department and school of petroleum and oil engineering. The latter school is very largely due to the great sum of money which has come to the University from the leading persons engaged in the oil industry in Great Britain; and it is the intention of the University to build up a great school of oil engineering which, with the exception of the work done at the Imperial College, London, will be the only such school in the British Empire.

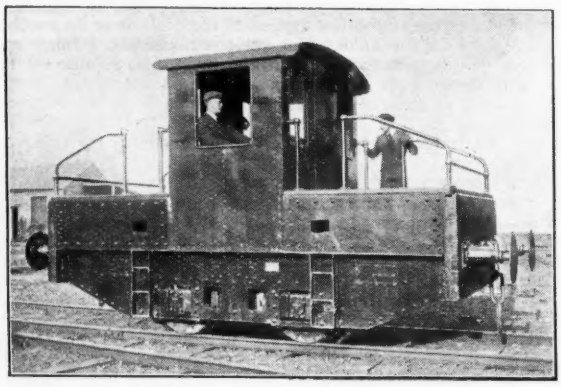
An Electric "Drip" Wagon.—For some time past, the Consolidated Gas Company of New York have had in use for collecting "drip" an electric motor vehicle specially equipped with a tank of 250 gallons capacity. The motive power is supplied by a storage battery, which also supplies current to run a centrifugal pump, capable of raising 30 gallons a minute. Travelling about Manhattan Island, this electric "drip" wagon is doing work that formerly required two horse-drawn vehicles, and is covering an average daily distance of 21·55 miles. Since being placed in service at the beginning of June last year, it has not missed a day of work from any cause whatever, and in the first six months it travelled a total distance of 3193 miles. A hand pump is carried in addition to the electric pump, and is sometimes used when pumping is necessary from two mains which are accessible from a common spot, and speed of operation is important.

A STORAGE BATTERY SHUNTING LOCOMOTIVE

At the Great Harwood Gas-Works of the Accrington Gas and Water Board.

That electricity has become a useful assistant in the production of gas is now well known and generally accepted; but we think a new departure in this direction has been made by Mr. A. J. Harrison, the General Manager of the Accrington Gas and Water Board. He has installed at the Board's Great Harwood Gas-Works an electric storage battery locomotive, for the handling of the whole of the traffic from the neighbouring goods yard, and for its transfer to the different parts of the gas-producing and bye-products plants.

This work was previously performed by horse labour; but the closing down of the Board's Accrington works, and the centralizing of the whole of the manufacturing operations at the Great Harwood works, necessitated some more up-to-date method of dealing with the traffic. The tonnage to be handled (approximately 60,000 tons per annum) made it impossible to cope with the work under the old conditions, especially as the whole of the traffic has to pass over a single track, across the main road which divides the gas-works from the railway sidings. Local legislation prevented the use of overhead trolley wires or steam locomotives across the road, so that attention was directed to the storage battery locomotive, which presents many advantages over the steam locomotive. In shunting work there is inevitably a large proportion of the total time when the locomotive must be standing, during which the steam locomotive is burning coal. Moreover, by reason of these idle periods, steam has to be continually turned into cold cylinders, with the result that the over-all thermal efficiency is very low. Further, time and money are wasted in lighting-up fires, raising steam, blowing-down, and coaling and watering.



The Storage Battery Electric Locomotive.

The electric locomotive has the advantage of taking no power except when it is wanted for useful work; and it is then employed efficiently. The machine is instantly available for use, simply by turning the controller handle. Further, the electrical equipment is simple and robust, so that repairs are practically eliminated; and the locomotive never has to be laid-up for days on end, as is the case with the steam locomotive, when fire box or boiler tubes go wrong. The result is that running costs are very much less with the electric locomotive than with steam.

All these considerations led to the installation, about ten months ago, of the battery locomotive described below. It has unquestionably proved itself, from any standpoint, a very efficient means of handling the traffic. A few hours each day are sufficient to do all the shunting work required. The track is arranged so that the bulk of the shunting is done in the gas-works yard, and not in the Railway Company's yard. The wagons are easily marshalled for clearance; the effect of this being that demurrage and wagon charges are now practically *nil*, whereas the time taken with horse traction often made these charges inevitable.

An average of eleven horses was previously required to handle the traffic at both works. Now an increasing tonnage is dealt with in less than half the time; the locomotive being easily handled by one man. At the moment it is not possible to supply figures as to the cost of running, or the saving effected, as the particulars for a full year's working are not yet complete. But it is claimed that the economies effected over the old system will meet the cost of the locomotive, house, and fitments in less than two years.

The locomotive is housed close to the works generating station. Electricity is employed for all coal and coke handling machinery, and this plant is not run to its full capacity during the night; so that there is sufficient energy available for charging the batteries, and incidentally improving the load factor on the generators. About four hours' charging per night is sufficient, with an extra long charge each week-end.

The locomotive is one of the well-known Jeffrey machines, and was supplied by Messrs. Hugh Wood & Co., Ltd., of Newcastle-on-Tyne. It weighs, complete with its battery, about 12½ tons, and, as will be seen from the illustration, is arranged with a central cab, in which are mounted the controller, brake-operating gear, sanding operating gear, and the switchboard, on which are fitted the necessary switches, fuses, instruments, &c., which include an ampere-hour meter, whose function it is to indicate exactly the condition of the battery either on charge or discharge. This instrument is also provided with a tripping device, which opens an automatic circuit breaker immediately the charge is completed.

The brakes are of the self-locking screw type, and spring buffers are fitted suitable for the traffic. The locomotive wheels are steel tyred, and 33 in. in diameter, giving a rail clearance of 5 in. The two motors each drive through a pair of forged steel machine-cut gears on to the axles. They are capable of giving a tractive effort at the wheel rims of 6300 lbs. for half-an-hour continuously, without overheating, and will, of course, develop tractive effort to the limit of rail adhesion (which, with a good dry rail, will be about 7000 lbs.) for slightly shorter periods without danger. This means that the locomotive will move over 300 tons on straight level track. The speed of the locomotive is about 3 miles per hour when doing its rated load. The controller is of the series parallel type, and so arranged that the motors can be started either in series or parallel.

The battery is arranged in two compartments fore and aft of the central cab. It consists of 120 K 29 Ni-Fe cells made by Messrs. Batteries, Ltd., of Redditch. These cells are of the nickel iron alkaline type, and are well able to withstand the mechanical shocks incidental to shunting work. The cells have steel containers, and are mounted in special crates on porcelain insulators. They require practically no attention beyond filling-up with distilled water once a week. The capacity of this battery per charge is 41 KW. hours at normal rate; and this can, if necessary, be increased to 55 KW. hours by boosting at noon for an hour at twice normal rate. This is equivalent to 500 ton-miles per charge, or 690 with boost. The number of cells was selected so as to be suitable for charging from the existing 220-volt circuit.

COOLING AND MIXING GASES.

By NORTON H. HUMPHRYS.

In a general way, the advantages of cooling and thus partially drying gases, and of mixing them so as to secure a uniform composition at the holder outlet, are well known; but the fact that modern researches and modern conditions have accentuated their importance, is not so fully appreciated. The Life of Gas Meters Research Committee appointed by the Institution of Gas Engineers have shown that the moisture content of gas is a powerful factor in connection with corrosion and deposits in mains, services, and meters; while under the Gas Regulation Act, 1920, an official test taken twice a quarter may be used, as representing the average quality, for penalty and other official purposes. The effects on the water content of reducing temperature are shown in the following table.

Water Content of Gas at Various Temperatures.

° Fahr.	Grains per Cubic Foot.	Increase.	Gallons per Million Cubic Feet.	Increase.
32	2·1	..	30·0	..
37	2·6	0·5	37·1	7·1
42	3·1	0·5	44·3	7·2
47	3·7	0·6	52·8	8·5
52	4·4	0·7	62·8	10·0
57	5·2	0·8	74·3	11·5
62	6·2	1·0	88·8	14·5
67	7·3	1·1	104·5	15·7
72	8·5	1·2	121·6	17·1
77	10·0	1·5	142·9	21·3

The variation in atmospheric temperature during the 24 hours is as much as 25° Fahr.; the minimum being attained about two hours after midnight, and the maximum about the same time after noon. If the gasholder tank is entirely below ground, the tank water responds very slightly to these variations. If entirely above ground and with naked sides, a difference of 10° or more may be observed. The inlet and outlet pipes pass through the tank water, and the temperature of that liquid determines that of the inlet and outlet gas. In hot summer weather the gas in the roof of the holder may be raised to 80° or more; but before it can escape to the district, it must descend to the base, pass in close contact with the tank water, and traverse a long length of submerged outlet pipe. It is therefore distributed at or near the tank-water temperature. The variations to which the gas may be exposed in the course of 24 hours have little or no effect. If this was not so, the above table will show that even in a small works enormous quantities of water would be carried forward from the holder to the district. A million cubic feet of gas, sent out at 67°, would carry over 100 gallons of water, of which nearly 50 gallons might be expected to be deposited in the mains and services; the average temperature at the meter being about 50°.

Suppose that, instead of withdrawing gas from the holder at the

base, the outlet pipe extended nearly to the roof. The result would be that during at least half of the 24 hours the gas would be sent out lower in temperature (and consequently with less moisture) than the tank water, and also without close contact therewith. If the difference was only 10° (say, tank water 62°, and gas 52°) the water content would be reduced from 89 to 63 gallons per million c.ft. In the course of distribution, such gas would exercise a drying effect, preventing temporary or permanent patches of dampness, at places on the interior of mains, services, and meters that, according to the report above-named, are so conducive to corrosion of piping and injury to meters. Any rust or other deposit in the pipes, being dry, could more readily be driven forward by the force-pump, and would not be liable to accumulate in elbows or tees.

There is no process of gas manufacture that yields a uniform, even quality from hour to hour. All processes show a steady backward trend from start to finish. In large works a sufficient number of vessels, or frequent charging periods, may reduce the variation to negligible limits; but where the charging periods must of necessity be not less than two hours apart, the quality follows in waves. If the charges are respectively at 2, 4, 6, 8, and 10 o'clock, and the average quality is 500 B.Th.U., as soon as the rich gas gets through (say in about one hour) the quality rises from the minimum of 475 to about 525 B.Th.U. It then steadily falls for two hours, until the gas from the next charge sets-up a second similar wave. If only one holder is in use—and it frequently happens that if there are two holders only the larger will give sufficient pressure to meet modern requirements—a considerable part of this variation will go forward from the holder outlet. If the official examiner happens to take a test at the ebb, the average quality may for official purposes be recorded as 20 units or so below the correct figure. If the gas is below standard, a second test may be taken an hour later, which would tend to a correct average. But there are many other causes likely to affect the quality, especially so until sufficient experience has accumulated to enable the calorific value to be efficiently controlled. The coal used is not of uniform quality, and some kinds are notorious for fluctuation, one truck as against another. This can be minimized by judicious mixture. As retorts advance in working life, or for a few hours after cleaning, they are apt to be unsound. Other defects that will be rendered apparent by regular calorific tests—such as levels of dips—can be remedied. Even after engineers are as familiar with therm values as with cubic feet, there will remain causes of variation that, at any rate in small works, are beyond control.

Humphrys' patent No. 23432 of 1922 affords a means of dealing with efficient drying and mixing of gases. The exact method of application must be adjusted to meet magnitude of operation and other local conditions. Frequently there is a small practically unused holder at a gas-works, which might be used as a mixing holder, either before or after the governor. And it could be made to serve a battery comprising any number of holders or distribution systems. In any system requiring a relief holder, the arrangement not only mixes the gas, but enables the holder to be used as a condenser and cooler. The holder can be worked between full and empty, at any position found most suitable.

By application of the methods included in this patent, which are cheap and easy of application, a uniform quality of gas can be ensured, and the troubles due to deposits of water, corrosion of meters, services, and mains, will be minimized, if not utterly removed. Any accumulated dust will be quite dry, and can be more readily displaced by the use of the force-pump. The risk that repeated forcings will in time make matters worse by accumulations in awkward bends, and so on, is done away with.

[The specification referred to above by the author will in due course be dealt with in our "Register of Patents."—ED. "G.J."]

Lower Costs and Lower Price at Croydon.—Lower working expenses and cost of production have led the Croydon Gas Company to announce a further reduction of 1d. per therm in the price of gas, to take effect at the Christmas reading of the meters. The future price, 10d. per therm, will be a reduction of 3·8d. per therm on the charge made last October.

Stourbridge Gas Cheaper.—The report presented by the General Committee at last week's meeting of the Stourbridge Town Council contained a recommendation that the price of gas for ordinary and power supply be reduced after the reading of the meters at the end of the September quarter by 6d. per 1000 c.ft. The Committee also recommended that the present agreement for street lighting in the Lye and Wollescote urban district be continued until Aug. 31, 1923. The report was approved.

Primitiva Gas Company's Results.—The cabled working results of the Primitiva Gas Company of Buenos Ayres for the six months ended June 30 show a profit of about £28,000, as compared with £25 000 in the corresponding period of last year, before deduction of debenture interest and fixed charges in London. Commenting on this statement in their City Notes, "The Times" say that for the whole of 1921 the Company just managed to cover their fixed charges. They are still suffering acutely from the wholesale loss of customers that occurred as a result of conditions ruling during the war, when inability to obtain coal affected severely both the quantity and quality of gas produced. The handicap of scarce and dear coal is now a thing of the past, but, in consequence of the poorness of demand, two out of the three works owned by the Company are closed-down. The management are making strenuous efforts to recover lost patrons by a house-to-house canvass, and recent returns show that this is meeting with a measure of success.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Therm and Gas Prices.

SIR,—There is an aspect of charging by the therm which seems to have been overlooked in the recent controversy—*i.e.*, the possibility which is opened-up of putting a little on the price of gas without disclosing it to the consumer. If a gas company declare a slight increase in calorific value, this automatically increases the price per 1000 c.ft., but the change is hidden from the consumer, because the price per therm is unaffected.

This is precisely what was done recently by the South Metropolitan Gas Company, when, after reducing the price per therm, they altered the calorific value from 550 to 560 B.Th.U. Is it not a fact that, by adding only 1·8 p.ct. to the calorific value, they raised the price of gas 1d. per 1000 c.ft., *without telling the consumer*, and leaving him to get the advantage of the minute increase in calorific value if he can? I should like Dr. Carpenter to say for what reason the change was made, if it was not to get an enhanced price without having to declare it; and let him say what steps his Company have taken to advise the consumer how to get the advantage of 1·8 p.ct. greater calorific value.

Sept. 29, 1922. A SOUTH METROPOLITAN CONSUMER.

[Before war broke out, the thermal value of the South Metropolitan gas was something over 560 B.Th.U. During the war period and for two years after the Armistice, its average yearly value was something over 550 B.Th.U. In October, 1920, the declaration of calorific value had to be made; and Dr. Carpenter strongly pressed upon the engineering staff the importance of declaring for the pre-war figure of 560 B.Th.U. It was pointed out, however, by the staff that the plant had not yet been restored to its pre-war efficiency, and that, moreover, no experience had been obtained of working under the onerous restrictions of the Gas Regulation Act as regards testing. Agreeing that there was something in this contention, Dr. Carpenter conceded the point. Some few months ago the engineering staff felt that they were then in a position to supply the pre-war quality, and notice to this effect was accordingly given. It should be borne in mind that it was to the pre-war quality that practically all the appliances in use on the Company's district were adjusted. It will be remembered that the declaration of increased value synchronized with a fall in price of 13 p.ct.—ED. G.J.]

Therms and Cubic Feet.

SIR,—The Gas Regulation Act intended that the greatest number of heat units should be produced per penny expended, and to make comparable all production costs and charges to the consumer by the application of a common factor.

In the circumstances, let us suppose that 500 B.Th.U. gas be the most profitable from the cost of production standpoint. With costs working out at 10d. per therm, a consumer would pay 4s. 2d. per 1000 c.ft. Why, therefore, in every gas bill do we multiply volume by declared quality and divide the result by 100,000 in order to yield a figure which if multiplied by 10d. produces 4s. 2d., when volume registered multiplied by 4s. 2d. gives the same result? Is it surprising the public say there must be some dodge in it? Consumers who think their bills reasonable assent, but are living in expectation that they will be done later—surely a most undesirable condition of affairs!

Were these bills, however, extended at so much per thousand, and the declared quality and the equivalent price per therm *printed on the billheads*, consumers might in time come to regard the equivalent price per therm as the true comparative factor. Until we return to reason, I am convinced the public will always be dissatisfied, and we may expect fresh outbursts each time quality changes. This means the vaunted "freedom" in our "charter" will be sacrificed in the cause of peace.

Unfortunately the altered system of charging for gas has been overdone. It adds unnecessarily to cost, is cumbrous, and threatens to stultify the whole object of the Act. OIKONOMIA.

Oct. 2, 1922.

REGISTER OF PATENTS.

Valve for Steam, Liquids, or Gases.—No. 180,903.

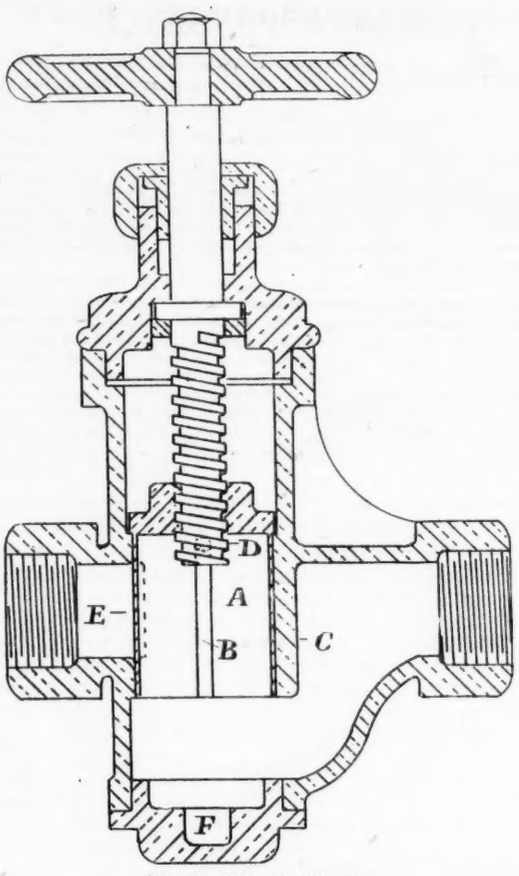
BEZANT, B. P., of Dartford.

No. 15,292; June 2, 1921.

This invention relates to valves of the open-ended hollow piston screw-down type, split or divided longitudinally at two diametrically opposite parts and provided with means to prevent rotation in the cylindrical casing in which they move. The patentee points out that in such valves as heretofore proposed, the inlet port is so arranged that the steam or other fluid admitted impinges direct on to the side of the valve, tending to its distortion.

According to the present invention, the valve is located in a cylindrical liner so disposed that the admitted fluid enters the valve from the bottom of the liner or cylinder, thus exerting pressure inside the hollow piston-valve, causing it to expand and thus ensuring a tight fit and preventing leakage.

A sectional elevation is reproduced. The valve A is formed by an accurately fitting hollow piston having two longitudinal slots B cut



Bezant's Valve Modification.

diametrically opposite to each other nearly the whole length of the piston, so as to make it springy laterally when pressure is exerted on the inside of the piston-valve. This valve A slides in a cylinder or liner C formed in the body of the appliance in which the valve is incorporated. To prevent the piston-valve rotating, the pin D is provided in the cylinder for one slot in the valve. In the liner or cylinder is a hole or port E which is covered, or partly covered, by the piston valve, or is full open, according to the position of the piston valve. F is a removable plug fitted at the bottom of the body of the casting, with the object of enabling any deposit which is scraped off the seating by the valve to be easily removed.

Recovering Bye-Products from Distillate Gases. No. 184,507.

ROBERTS, A., of Chicago.

No. 4996; Feb. 12, 1921.

This invention relates to the recovery of bye-products from coke-oven distillates; the process and apparatus being flexible to the extent that it may be used for the recovery of all of the hydrocarbon bye-products which are ordinarily recovered from distillate coal gases, either in gaseous, liquid, or solid form.

The process consists in subjecting the distillate gases to a preliminary treatment by the injection of a suitable medium into the gases for the purpose of increasing their vapour tension and controlling their temperature, and progressively lowering the temperature of the gases by stages, whereby the temperature of the gases at each stage is lower than the temperature of the gases at the preceding stage; thus fractionally and progressively removing a plurality of bye-products from the gases without reheating between the stages.

In the preliminary treatment there is injected into the mixture of gases from the carbonizing chamber an oil or emulsion so constituted, and in such quantities, that its vaporization will serve to bring the distillate gas into the desired conditions of temperature and saturation of the several constituents. If, for example, it is desired subsequently to remove the carbolic oils, there is injected into the gases freshly delivered from the oven either carbolic oils or a mixture or emulsion including carbolic oils, so as to enrich the gas in such oils. By so doing, the condition of saturation of these oils will be improved, so that during the fractional condensation the carbolic oils will come down more readily and completely at the proper stage. Or, for example, if it be desired to remove the benzole during the fractional condensation, the gases freshly delivered from the oven are subjected to a preliminary treatment by injection of benzole, or a mixture of oils or an emulsion including benzole, so as to improve the condition of saturation of the gases as regards this constituent.

During the succeeding steps of fractional condensation, the several condensation steps are arranged in such form and order that the various constituents may be brought down in the order of their dew-points, and without the necessity of any reheating whatsoever. When an ammonia extractor is used, the ammonia likewise may be removed at such a point in the process that any subsequent constituents, such as benzole and the like, may be thereafter taken off without the necessity of reheating or auxiliary treatment.

Regenerators.—No. 184,744.

SCHULZ, H., of Aplerbeck.

No. 34,948; Dec. 29, 1921.

This invention relates to regenerators formed of hollow bricks set side by side and end to end in series, so that one set of passages is formed by the conduits in the bricks and the other by external channels in the walls of the bricks. The external channels are formed by the bricks each having an external constriction, and gaps or breaks in what may be called the head and foot portions thereof, so that when a regenerator is built-up of such bricks the gaps or breaks, lying in line, form straight parallel passages joined to each other by the annular channels.

Gas-Burners.—No. 185,186.

COLEY, H. E., of The Temple. E.C., and DICKSON, D. H., of Maida Vale, W.

No. 14,692; May 26, 1921.

This invention relates more particularly to gas-burners for cooking purposes. The main flame is emitted from a number of combustion apertures supplied with gas and air from a mixing chamber; and an auxiliary central combustion aperture is supplied with partially mixed air and gas through a relatively small tube which bye-passes the mixing chamber. This obviates a cold centre in the main flame; and the arrangement allows for a supply of additional air to the latter.

The mixing tube is supported above a nipple, so that air for combustion is entrained on all sides of the jet of gas; and the air and gas are partially mixed in the tube. Into the tube enters a smaller tube for conveying a small proportion of the partially mixed air and gas direct to the combustion surface. A conical deflector surrounding the smaller tube diverts the major portion of the mixture into a relatively large mixing chamber in which thorough mixing is effected; the mixture then passing through perforations in the upper or combustion surface of the mixing chamber.

The air for combustion, before reaching the gas-jet, is brought into contact with the heated surface of the mixing chamber, thereby becoming preheated.

Gas-Burner Adapter.—No. 185,272.

CANNON IRON FOUNDRIES, LTD., and HAWTHORNE, H. S., both of Deepfields, near Bilston.

No. 18,071; July 4, 1921.

This invention relates more particularly to the burners of gas-cookers in which rests are provided above the burners for supporting the utensils. Such rests are arranged at a certain height above the burners according to the normal pressure and quality of the gas employed. Should the pressure or the quality of the gas be reduced, the flame will not come sufficiently close to the cooking utensils.

The invention provides an adapter which may be placed over the nozzles of the burner head so as to bring the flame nearer to the rests. It comprises a continuous inverted trough-sectioned cover or casing having an open bottom and provided in its top face with a series of auxiliary burner nozzles. It is arranged to fit over the existing nozzles of the burner head, and forms a compartment into which the gaseous mixture passes; the flame being thus brought nearer to the bars or rests of the cooker. The adapter may either rest loosely upon the burner or may be clamped thereon by suitable means.

Incandescent Gas-Burners.—No. 185,276.

DUFFIELD, F., of Smethwick.

No. 18,414; July 7, 1921.

The present invention has relation to incandescent gas-burners involving a nipple-regulating valve slidable in a housing. The valve, of hollow cylindrical construction, is adapted to be operated by a lateral hand-rotatable shaft which extends across the housing and terminates in a blind aperture therein; and the shaft is provided with a disc or cam projecting laterally therefrom and adapted to engage a slot in the valve for its operation.

Conveniently two circular discs are employed eccentrically upon the shaft, and are adapted to co-operate with diametrically opposed slots or apertures in the wall of the valve for its operation; and the shaft may be prevented from axial displacement, and a gas-tight joint may be effected, by a cup member screwing into the housing and compressing a washer between itself and an annular projection on the shaft.

Atmospheric Burners for Gas Appliances. No. 185,209.

HADLEY, W. W., of Kennington Road, S.E., and HUNTER, C., of Gordon Square, W.C.

No. 14,984; May 30, 1921.

This invention relates to atmospheric burners for gas appliances, and has for its objects (*inter alia*) to effect complete combustion and to economize fuel consumption. Burners have been proposed comprising a mixing chamber located above, and connected by a constricted portion or passage to, a burner head provided with apertures for remitting the mixture which is ignited at this point. Thereby the mixing chamber is heated; but in all such previously proposed atmospheric burners, the apertures for emitting the mixture have not been so arranged that the resulting flame is caused to impinge directly against the constricted portion.

According to the present invention, this direct impingement is effected; while the burner may be of any desired configuration, depending upon the nature of the installation.

Thus, one form of burner may consist of an upper mixing chamber

substantially cylindrical and communicating along its lower side, by means of a constricted neck or passage extending along same, with a lower chamber forming the burner head—of an inverted saddle form and narrower than the mixing chamber. At about midway of the length of the burner, an admission tube extends through the burner head (but not communicating therewith) and projects up into the mixing chamber to a point near the top, being connected to an injector for producing the necessary mixture. The flames from a series of apertures impinge against the exterior of the mixing chamber at or near the constricted portion thereof.

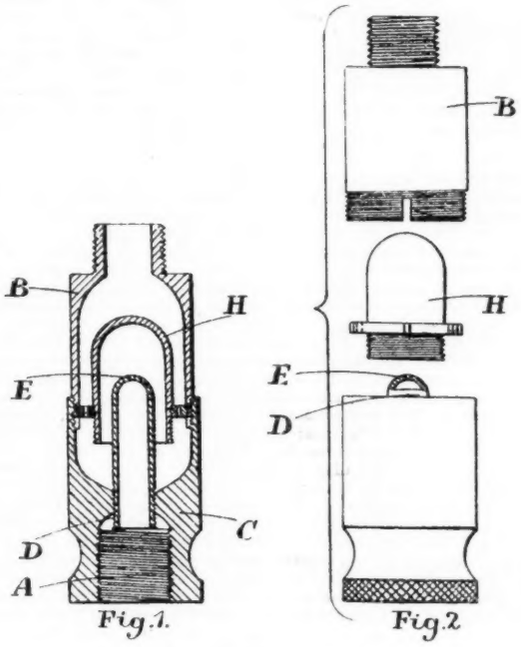
Instead of a single admission tube there may be two or more, and similarly there may be double or treble rows of apertures for the emission of the gas, fitted or not with individual nozzles; while, of course, all the flames need not be directed against the constricted portion of the mixing chamber.

Reducing Gas Pressures.—No. 185,366.

WEIL, C. R., of Battersea, S.W., ROBINSON, F., of East Dulwich, S.E., and GOULD, A. J., of Vauxhall, S.E.

No. 1466; Jan. 17, 1922.

This invention relates to gas-pressure reducing apparatus of the kind furnished with chambers of increasing capacity, so that the gas passes from a smaller chamber to a larger one; its pressure being thus reduced.



A Gas-Pressure Adjuster.

Fig. 1 is a longitudinal section through the device, and fig. 2 a side view showing some of the parts dissembled. In action, the gas passes from the inlet port A through the tube D and its orifice E, where it impinges on, and is deflected by, the interior concave face of the concentric tube H. It now passes back in the annular passage between the two tubes D and H, and when it contacts with the interior flange C, is deflected once more in a forward direction, down the annular passage between the outer casing and the tube H, and then through the outlet nose B.

It is obvious that the device may be employed in connection with uses other than coal-gas supply.

Towyn Gas-Works Flooded.—Floods caused trouble to the gas supply of Towyn, Merionethshire, last Saturday week. The embankment of a stream was washed away, with the result that water got into the gas-works and stopped the town supply. The Gas Manager, who lives on the works, had to convey provisions to his family by means of a raft.

Reparation Dyestuffs Selling Arrangements.—The Board of Trade state that the appointment of the British Dyestuffs Corporation as agents for the distribution of reparation dyestuffs from Germany has been accompanied by the following modifications of the arrangements formerly in force: All prices now quoted will include delivery to purchasers' works or stores, and will not be subject to the 1 p.ct. commission hitherto charged. Such prices will be in respect of 60 lb., 120 lb., or 240 lb. packages (which will be free and not returnable), and a reduction of 1d. per pound will be made on all purchases of 4 cwt. or upwards, while in the case of purchases of not less than a ton the standard price will be subject to a reduction of 2d. per pound. On the other hand, purchasers of less than 60 lb. will be subject to an addition ranging from 1d. per pound in the case of 20 lb. lots to 3d. in the case of 1 lb. lots, to cover the cost of extra packing. In other respects the British Dyestuffs Corporation will act solely under the direction of the Board of Trade. Inquiries on the subject should, in the first place, be addressed to the British Dyestuffs Corporation, Ltd., Reparation Department, 70, Spring Gardens, Manchester.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" regarding applications to the Board of Trade for Orders under the Gas Regulation Act.

Fareham Gas and Coke Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 3d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 18·8d. per therm.

Wilmslow and Alderley Edge Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 10d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

SPECIAL ORDER.

Kingston-upon-Thames Gas Company.

The Company are applying to the Board of Trade for a Special Order to enable them to hold annual instead of half-yearly meetings, and to declare interim dividends.

SALESMEN'S CONFERENCE AT CARDIFF.

The first meeting of the Salesmen's Conference took place in Cardiff last Thursday. By the invitation of the Directors of the Cardiff Gas Light and Coke Company, the meeting was held at their offices in Bute Terrace. The General Manager and Secretary of the Company, Mr. George Clarry, presided, but explained that it was for the occasion only, and in future the salesmen would conduct their own affairs. At the same time, he welcomed the representatives of the various undertakings, and explained the desire which was prevalent to increase the efficiency and salesmanship of those engaged in the work.

Mr. Clarry then introduced Mr. W. M. Mason, the Manager of the British Commercial Gas Association, who addressed the meeting on "Salesmanship," and particularly the work in its connection with gas undertakings. From a general survey, he proceeded to deal with the training and attitude of gas salesmen to consumers, and brought prominently before the notice of those present the necessity for optimism and tact combined with sound knowledge and hard work.

The meeting was then opened for discussion, and Mr. J. Robb (Chepstow), Mr. J. Herbert Canning (Newport), Mr. A. H. Shepherd (Swansea), Mr. J. Mogford (Briton Ferry), Mr. E. Morris (Briton Ferry), and Mr. B. J. Bell (Cardiff) took part.

The meeting proceeded to form a Committee, which it was agreed should consist of ten members; and the following were appointed, with power to co-opt one to their number: Messrs. B. J. Bell (Cardiff), A. H. Shepherd (Swansea), C. H. Collins (Newport), E. Morris (Briton Ferry), J. Robb (Chepstow), Geo. Steele (Rhymney and Aber), L. Murray (Blaina), F. Rutley (Rhondda), and D. M. John (Aberdare).

The members were afterwards entertained at tea by the Cardiff Gas Company, and subsequently it was moved and agreed that four meetings should be held in the year, and that the first should be on Oct. 26. The details were left to the Committee.

After tea the Committee previously appointed met to conduct preliminary business, and selected Mr. G. Steele, of the Rhymney and Aber Valleys Gas Company, as Chairman. It was decided that Mr. B. J. Bell, of Cardiff, should act as Secretary to the meetings.

After some discussion, it was moved that the place of next meeting should be Llanelly, and that the Engineer and Manager (Mr. Harold Barker) should be approached with a view to providing facilities for the conference. Failing this, Mr. A. H. Shepherd would make arrangements with the management to provide alternate accommodation at Swansea, if necessary. It was further arranged that the subject to be brought forward on the occasion of the next meeting would be "Aims and Objects of Salesmen's Meetings, and the Best Means of Attaining Same." The subject is to be opened up by Mr. B. J. Bell, and followed by contributions from other members of the Committee, who will be prepared to continue the subject in a series of short papers.

NATIONAL BENZOLE COMPANY'S PRICES.

Important Announcement.

The National Benzole Company, Limited, announce that they are prepared to continue the sale of "National Benzole Mixture," containing a guaranteed quantity of 50 p.ct. "National" benzole and 50 p.ct. No. 1 petrol at the reduced No. 1 price.

The superiority of this spirit has been established in the short time it has been on sale; and all motorists appreciate the 15 p.ct. increased mileage obtained, as this represents a considerable saving in running costs. The quality of the spirit will be maintained at the present high standard, and the Company hope this concession will assist the development of this very important British industry.

The current retail prices of "National" benzole and "National Benzole Mixture" are: "National" benzole, cans, 2s. 4d. per gallon; and "National Benzole Mixture," cans, 2s. per gallon.

Messrs. Sir William Arrol & Co., Ltd., of Glasgow, have secured a contract in connection with the building of new synthetic ammonia works at Stockton-on-Tees. The contract includes the erection of reinforced concrete store tanks of large capacity.

BRITISH GAS LIGHT COMPANY, LTD.

The Annual General Meeting of the Company was held on Wednesday last, at the new London Offices, No. 2, The Abbey Garden, Westminster, S.W.—Mr. Henry Woodall in the chair.

The Secretary (Mr. A. W. Brookes) read the notice convening the meeting, and the report of the Auditors; also the report referring to the Norwich station. The Directors' report and the statement of accounts were taken as read.

The Chairman, in opening his remarks, said that this was the first annual meeting to be held in the new offices, and he took the opportunity of saying how pleased the officials and officers were to have so pleasant a place in which to work. It was sad to leave George Yard, and the association of nearly a hundred years; but, as he told them before, this had to be, owing to the expiration of their lease and the purchase of the premises. He was glad to say they were able to dispose advantageously of the balance of the lease, and were very satisfied with their new quarters, the cost of which was considerably less than any corresponding accommodation in the City, even had it been obtainable.

A GOOD STATEMENT OF ACCOUNTS.

The accounts quite justified the results which they had expected from the Orders granted the Company under the Gas Regulation Act. At the smaller stations—Trowbridge and Holywell—the new Orders only came into effect after the Lady-Day quarter, 1922; but the Directors had every reason to expect that this year these two concerns would pull their weight, and add to the profits, instead of showing losses, as they did in the accounts now before them. The quantity of gas sold during the year showed an increase of 2·39 p.ct.—a not unsatisfactory figure. The result of the year's working was that, after paying 5 p.ct. for the half year (making 10 p.ct. for the year), *plus* a bonus of 2s. 6d. per share, they were able to add £15,000 to the general reserve, reopen the Hull reserve fund (which was exhausted in 1916) with £19,000, and add £2000 to the carry forward, which now stood at £58,983.

THE HULL STATION.

At Hull, their largest station, the results were so satisfactory that they had been able to reduce the charge for gas by 6d. per 1000 c.ft. from the end of March last, and a further reduction would be made at the end of this month, thereby reducing the price to 3s. 6d. per 1000 c.ft. At this station they had not yet adopted the therm basis of charge. The works here, as at all their stations, were in excellent condition. The Board had just been able to acquire suitable and commodious premises for a showroom, of which they had for some time felt the need, the existing premises being too small.

EXTENSIONS AT NORWICH.

At Norwich the capital expenditure had increased by £100,000, due to the large and extensive alterations which were greatly needed at the Palace Works. The total cost of these extensions would amount to £250,000, of which a considerable amount was chargeable to revenue. Because of exceptional charges, the profit from this station was £5000 less than the authorized parliamentary interest. Notwithstanding this, the Directors had reduced the price of gas from 1s. 1¾d. to 1s. 0¼d. per therm, or by 6d. per 1000 c.ft. of gas, as from the end of June last. The new installation of vertical retorts, and the results so far obtained from them, were eminently satisfactory. The whole works were now quite up-to-date. The alterations and extensions had been carried out under great difficulties, and the result reflected the highest credit upon Mr. Thomas Glover and his staff. ["Hear, hear."] At the request of the inhabitants, the Company were extending their mains to Wroxham and other outlying villages in the area of supply, and further capital would be needed; but there was every reason to believe the expenditure would be remunerative.

THE POTTERIES SALE.

At the last meeting, the shareholders entrusted the Board with power to dispose of the Potteries station, and they had exercised this power, and handed over the station to the County Borough of Stoke-on-Trent. The Directors were very reluctant to part with this property; but, as he said last year, it seemed better to come to terms than possibly be forced to sell. The bargain arrived at was a good one, both for buyer and seller; and though the Company did well, he thought the county borough were even more fortunate. They would see a figure of £73,295 12s. 5d. in the balance-sheet, headed "Surplus arising on sale of Potteries undertaking." This sum sufficed to meet back-dividends, and left a balance as compensation for severance. He would like to say that the Board much appreciated the way in which they were met by the Gas Committee of the county borough. The Directors, and no doubt the county borough, had gone most carefully into the accounts and value of the undertaking before they met, and they were practically in agreement, showing that both sides had taken a reasonable view of the position and of the value of the property. The whole of the negotiations had been carried out in the most friendly way, and he was sure the shareholders would be pleased to know that Alderman Brookhouse (the Chairman of the Gas Committee) had acknowledged that the Company had always carried on their undertaking most satisfactorily. ["Hear, hear."] That they had obtained so good a price for the concern was largely due to the foresight shown by the Directors in purchasing the best site for gas-works in the Potteries area, and in building new and up-to-date works upon it nearly twenty years ago. The proprietors would wish to know what had been done with the large sum of money received—namely £345,000. They had paid off a loan from the bank of £100,000, and the remaining £245,000 at June 30 last was included in the £251,401, "Cash at bank." Of this balance, £200,000 was immediately invested in National War Bonds, repayable in 1927, until such time as it was needed for the purposes of the Company. Norwich alone would absorb a large amount. The effect of the sale was to put the Company in a very good financial position, and there was little doubt they would be able to invest in the remaining undertakings advantageously. The effect would probably be to give them a better return on their capital than they could have earned at the Potteries. It was expected that the balance of about £60,000 due by the county borough would be paid in about a month's time, and they would find an immediate use for it. Their late Manager at the Potteries, Mr. C. R. Armitage, received compensation from the Corporation; and the Directors were glad to say they had been able to retain him in the Company's service, in a somewhat different capacity. They wished to acknowledge Mr. Armitage's services, and to thank him for the splendid condition in which they were able to hand over the property. The Directors felt sure they would have the support of the shareholders in their proposal to pay all the employees at the Potteries station at the date of transfer a week's wages, in recognition of their faithful service. ["Hear, hear."]

A CONTROLLING INTEREST AT SWANAGE.

The Board were looking out for any paying investments, and had been able to purchase a controlling interest in the Swanage Gas Company. Improvements had already been made there, and their comparatively small investment in this undertaking was likely to prove a good one.

SHARE VALUES AND A CONVERSION SCHEME.

At their last meeting, he prophesied a rise in the value of their shares, and advised proprietors to hold them; and he was glad to say that the ordinary shares, which then stood at £23 10s., to-day realized about £33. In this connection, he might tell them that the Board were considering a scheme of conversion of shares into stock. As they knew, the total cost of capital was under 6 p.ct., because very large premiums had been paid for the shares, amounting in all to £325,000, which bore no interest. The dividend, therefore, did not indicate what the shareholder received on his investment. He himself paid £42 per £20 share for the ordinary shares he held in the Company, and one of his colleagues paid as much as £57 for some of his shares. The result of a conversion would be that the declared dividend would more nearly approximate to the actual than at present. When the scheme was complete, they would ask the permission of the shareholders to carry it out. All the works of the Company were in excellent condition, though there was still a little to do on what were called deferred renewals—that was to say, work that could not be carried out during the war.

THE THERM QUESTION.

Before concluding, they might expect him to say something about therms. He would refer them to his remarks made a year ago, when he said they welcomed the substitution of a calorific standard for one of illumination, but objected to alteration in the system of charge as being certain to cause irritation without in any way helping the consumer or the suppliers of gas. Irritation there had undoubtedly been; but he was of opinion that this irritation was caused, not so much by the introduction of the therm (which had come to stay) but because the new method of charge coincided with an increase in price, which latter was inevitable if gas shareholders were to receive a moderate return on their capital. The position of their Company was unique, in that they were charging both by the 1000 c.ft. and by the therm; and it was interesting to note that at Hull, where they still charged by the 1000 c.ft., their largest profits had been made. It was therefore unfair to head their articles on the Company's working for the year—as several newspapers had done—"Thanks to the Therm." Their thanks were due to the Gas Regulation Act, which allowed them to increase their price in accordance with the increased cost of production. The therm charge had been made a peg on which to hang very unfair criticism of gas charges, and a suggestion that they were unreasonable, and that the consumer was not considered. This was absolutely untrue, and they knew, as business men, that the only road to success was to supply a good article at a reasonable price. The cost of coal delivered into the works was the most important factor in the price of gas, and it would interest them to know that the average cost of coal at all the stations was in the year ended June, 1914, 15s. 10d. per ton. In the year ended June, 1922, it was 42s. 11d. per ton; and for the current year the price averaged 30s. per ton. Coal to-day was therefore nearly double the pre-war cost, and in no case were the Company charging double the price for gas.

LOW PRICES CHARGED.

Gas legislation had been on the whole very fair. The gas companies had been trusted by Parliament to act honestly, and on the whole they had been worthy of this trust. The best proof of this in their own case was that they had never charged anything like the price they were entitled to, except during the war, when they were forced to charge up to the limit in nearly all cases, and even then made losses. But at Hull, at the worst, they never charged 5s. per 1000 c.ft., to which they were entitled, but contented themselves with 4s. 6d. In 1914 they were entitled to charge 5s. per 1000 c.ft. at Hull, while they actually charged 1s. 10d.; and at Norwich the maximum allowed was 4s. 6d., while their charge was 2s. 10d. To-day they were nowhere charging anything like the maximum allowed—showing that, though they were given generous powers as to charge, in order to meet contingencies, they had not abused them, but did all they possibly could to sell good gas at the lowest price. Being a maximum priced Company, they gained no direct benefit from this, though indirectly, perhaps, the greatest benefit of all—the confidence of their consumers. The Gas Regulation Act had one great merit—namely, that under it the consumer had to pay only for what he received. Under the old Acts there was a small penalty for going below the standard, but under this Act the money value of any deficiency in calorific power was to be ascertained and deducted from the dividends payable. He thought the therm had come to stay, and that shortly it would become a familiar, and not distrusted, unit of charge, though its introduction was quite unnecessary to carry out the intention of the Act. They, in that Company, had been selling gas on a calorific basis for some time before 1920, when the Act was introduced, which meant that the consumer could always find out how many therms he was using, if it afforded him any pleasure or interest. In their case he would simply have had to multiply the number of thousands of cubic feet by five, as was also the case in regard to many of the large gas companies to-day.

LONG-SERVICE MEDALS.

The shareholders were aware of the Company's custom of giving medals and certificates to those who had served with them 25 years. They would be pleased to know that, at June last, the Directors had

issued no less than 318 long-service medals, which proved that their men appreciated the fact that they endeavoured to treat them in a just and reasonable way. In conclusion, he thanked the proprietors for their attention, and assured them that their property was being looked after by a most efficient and loyal set of officers and men, and that they might look forward to a steady increase in the business and a prosperous future. He moved the adoption of the report and accounts.

Mr. FREDERICK WILKIN formally seconded the motion.

Mr. SAMUEL SPENCER said he had been particularly interested in the therm portion of the Chairman's speech. He thought it would be a very great advantage to have the speech circulated, so that it might be known how faithfully the Company served both consumers and shareholders. On the previous day, when attending a Board meeting of a gas and electricity company, he asked the manager how he had been getting on, and the reply was that he had not had a single complaint. He thought that if consumers, when they looked at their accounts, would only make proper comparisons, they would find no cause of complaint. The criticism published in the papers was most unfair.

Mr. W. J. LIBERTY asked whether the Board had considered the advisability, when sending out accounts, of keeping the question of cubic feet alive, by showing the number of cubic feet on the statements, as well as the number of therms. This would disarm a great deal of criticism.

The CHAIRMAN: We always show cubic feet as well as therms on the accounts.

Mr. G. HAY MORGAN, K.C., made the further suggestion that it would be a very good thing to show, when there was a reduction, not only the reduction per therm, but the reduction per 1000 c.ft. In his most encouraging speech, the Chairman had referred to 6d. per 1000 c.ft. To the average man, this meant something, and sounded large; but when one alluded to 1d. or 1d. and a fraction per therm, it seemed nothing. It had occurred to him, in reviewing these accounts, that the Company had obtained, as the Chairman intimated, a very fair price for the Potteries station. He understood that the figure was arrived at not by arbitration, but by direct negotiation.

The CHAIRMAN: We had no outside assistance.

Mr. HAY MORGAN (continuing) said he did not know whether the Board had taken the matter into consideration, but it seemed to him that in this way the Chairman had saved them an immense amount of money. If they had gone to arbitration, it would have meant at least £4000 or £5000 out of the shareholders' pockets; and it was for the Board and the shareholders to consider whether it would not be a very nice thing to express in some tangible form their appreciation of the great amount of work the Chairman had done in bringing this matter to a successful conclusion. He merely threw this out as a suggestion.

The CHAIRMAN said he must thank the speakers for the remarks that had been made. They always did send out the Chairman's speech with the dividend warrants, so that the shareholders would get it. It was very kind of the last speaker to make the suggestion he did; but they all worked together in this matter.

The report and accounts were then unanimously adopted.

THE DIVIDEND.

On the proposition of the CHAIRMAN, seconded by Mr. WILKIN, it was agreed: (1) "That the payment by the Directors of the dividend at the rate of 7 p.ct. per annum on the cumulative preference shares of the Company, as mentioned in their report of Sept. 11, be confirmed;" and (2) "That the payment by the Directors of the interim dividend at the rate of 5 p.ct. on the ordinary shares, as mentioned in their report of Sept. 11, 1922, be confirmed, and that a final dividend at the rate of 5 p.ct., making 10 p.ct. for the year, also a bonus of 2s. 6d. per share, both less income-tax, be now declared, the same to be payable on Oct. 6."

RE-ELECTIONS.

Major-General WILLIAM T. CORRIE said he had great pleasure in proposing the re-election as a Director of Mr. Henry Woodall, their Chairman. He could not express in ordinary words how much his colleagues had appreciated him in his position as their pilot in all the work that had been undertaken lately. Mr. Woodall's pilotage had been successful, and they could not have a better captain.

Mr. WILKIN seconded the motion, which was cordially agreed to.

Mr. HENRY PULLMAN, J.P., in proposing the re-election to the Board of Mr. Lewis R. Abbey-Williams, said that in his capacity as a Director that gentleman had served them faithfully and well for many years, and it was a matter for congratulation that he had again consented to place his valuable services at the Company's disposal.

Mr. HAROLD G. PALMER seconded the proposition, which was unanimously passed.

Proposed by Mr. LIBERTY, and seconded by Mr. KENNETH R. MACKAY, Mr. E. Knowles Corrie was re-elected an Auditor; while Mr. William Cash was similarly re-appointed, on the motion of Mr. SPENCER, seconded by Mr. C. A. MORGAN.

VOTES OF THANKS.

Mr. F. R. W. SLY said he believed they had got so far through with the business of the meeting that he might initiate something on the shareholders' side of the table. After listening to a report such as they had heard that day, one felt perfectly justified in saying: "Well done, ye good and faithful servants." He asked for their unanimous support of his proposal that the best thanks of the meeting be given to the Chairman and Directors for their able management of the business of the Company. During the dark years of the war and since, the management must have been in very good hands, for throughout that period it was no mean achievement to maintain a dividend of 10 p.ct. Now the Directors had "gone one better," for they had been able to resume payment of the bonus. Pleasant surprises like this made one feel that good times were returning, and it was gratifying to think that their Company were leading the way. The Directors were to be congratulated upon the successful working, and upon the outcome of the negotiations in the Potteries. The loyal support which the Chairman and Directors received from the Secretary in carrying through the latter matter must have been a great help to them. He was sure they had all worked very hard, and the shareholders appreciated it. It had already been suggested that they should mark this appreciation. He believed that the fees paid to the Directors were small in comparison with the size of the Company, whose capital was nearly two millions of money. Consequently, when they had a good report they were justified in making recognition of it. Therefore, in addition to proposing a vote of thanks, he wished further to propose that the remuneration of the Directors be increased by £600 per annum, free of income-tax, or £100 to each Director, to date from Jan. 1, 1922.

Mr. F. A. JANSON, who seconded, said he quite agreed that the services of the Board ought to be recognized in the substantial way suggested. The sale of the Potteries station had been carried out in a very capable manner, because it must have been a difficult and delicate matter to get through. The shareholders were also again to enjoy the bonus which they had had to do without of recent years. All this called for more than an ordinary formal resolution of gratitude and appreciation.

The proposal having been heartily agreed to by the meeting,

The CHAIRMAN returned thanks on behalf of himself and his colleagues. He said that there had certainly been a very great deal of work to do in the last few years. It might have been thought, perhaps, that as they were getting rid of one of their largest stations there would be less for the Directors to do in the future; but he did not think this would be the case, because the investment of the money would require a great amount of consideration, and the new investments were likely to be more difficult to look after than the Potteries station, which had been going steadily on its career for many years. It was now his privilege to propose that the thanks of the meeting be given to the Secretary and officers of the Company and the staffs and workmen. The report that had been submitted was the best indication of the merit of both officers and men. The Company had always been very well served indeed. They had in their Secretary a gentleman of whom no one could speak too highly. Mr. Brookes had now been connected with the Company for 44 years, though one would hardly believe it to look at him. He did his work in a most admirable manner, and that work was very severe. As to the engineers, those who knew them were aware how extremely fortunate the Company were in this respect. Their senior Engineer, Mr. Thomas Glover, was with them that day, and the Board were pleased to have the opportunity of congratulating him on the very fine and beautiful works which he had now practically completed at Norwich. With these works, he (the Chairman) thought, they would get as good results as were obtained in any other works in England. The indications were that they would do very well indeed. As to the men, they were working now most excellently. The Board were thoroughly pleased with the work they did, and felt that the men were well earning the wages that were being paid them.

The motion was seconded by Mr. PALMER, and supported by Mr. LIBERTY, who suggested that recognition of the Secretary's services might be made, as had been done in the case of the Board.

The vote was unanimously accorded.

Mr. BROOKES said he was very glad to be able again to convey to the officials and their staffs this renewed expression of the shareholders' confidence in them. It was always very encouraging to have one's services recognized, and he was quite sure this vote would give great pleasure to every one to whom it applied, and stimulate all to further effort. On frequent occasions he had referred to the great consideration which officers and staff received at all times from the Directors of the Company. With regard to a remark that had been made, he would like to say that, just before entering that room, he had been informed by the Chairman that the Board had voted him a very handsome present in recognition of that portion of the work which had devolved upon him in connection with the disposal of the Potteries station.

Mr. GLOVER, who also returned thanks, said he was very glad to hear what had been said about the good service at the stations. The Company had very loyal staffs. Not only the engineers, but the engineers' assistants, chemists, clerks, and workmen, were all determined to maintain the reputation of the Company for good results, and so give satisfaction to their friends the shareholders. As to the kind reference which the Chairman had made to Norwich, he (Mr. Glover) thought a gas-works ought not to be an ugly place. It was up to the Company to show what could be done in having orderly, well-conducted works, and this was what they were doing at Norwich. He was sure it would be the wish of the Board that, if any shareholders were in Norwich, they should come and inspect the property, and he would be pleased to show them round.

Price Reduction at Birkenhead.—The Gas Committee are recommending the Birkenhead Town Council a reduction of 6d. per 1000 c.ft. in the existing charges for gas. The new prices, which will come into operation after the September quarter reading of the meters, will be 4s. 3d. per 1000 c.ft., instead of 4s. 9d. in the borough, and 4s. 9d. instead of 5s. 3d. in the districts beyond the borough boundary.

Nottingham Gas-Workers' Wages.—Agitation has been for some time rife among Nottingham Corporation gas-workers regarding rates of pay, and as the outcome of a meeting which was recently held, and addressed by Mr. A. Hayday, M.P., a deputation has been appointed to wait upon the Gas Committee to further discuss the situation. Mr. Hayday explained that the men are much concerned as to the action proposed to be taken by the employers respecting the sliding-scale of wages agreement. He expressed the view that an amicable settlement might be reached, if the men would interview the employers.

Gas to Supersede Electricity at Ashtead.—A good example in the exercise of economy has been set by the Ashtead Parish Council, who, we learn, have decided, rather than forgo acceptance of the lowest tender, to change from electricity to gas, and scrap their electrical fittings. They will accept the tender of the Wandsworth, Wimbledon, and Epsom District Gas Company to light 73 lamps at £4 per lamp, in place of the Leatherhead Electricity Company, Ltd. The Directors of the Electricity Company wrote expressing surprise at the Council's rejection of their tender, pointing out that the Company had incurred capital expenditure of over £600 on the mains and fittings supplied for the purpose of the street lighting, and asking the Council's serious reconsideration as to whether it was desirable that services which had been usefully employed for street lighting, and were ready for employment, should be destroyed and the capital involved therein entirely wasted.

GAS COMPANIES' CHARGES.

The Therm System as it Affects Consumers.

The members of the Kensington Chamber of Commerce assembled in the Town Hall on Monday of last week to hear an address by Mr. F. W. Goodenough, Controller of Gas Sales of the Gas Light and Coke Company, on the subject of "The Gas Companies' Charges: The Therm System as it Affects Gas Consumers."

In opening, Mr. Goodenough said he welcomed this opportunity of addressing the Chamber on the subject of gas companies' charges, because the companies had been very seriously misrepresented in this matter by a number of one-sided and unjustified statements based upon some quite genuine misunderstandings and doubts. The companies felt greatly concerned at the doubt created in the minds of those whose confidence they prized, and whose satisfaction was the basic principle of all their policy. As a matter of fact, there was no industry supplying a necessity of domestic and industrial life in connection with which the public was better safeguarded as regarded quantity, quality, and price than in the case of gas. Those who were engaged in conducting the industry hoped at least that they were honourable men, conducting a square business upon the only lines on which permanent success could be achieved—namely, by giving value for money, and ensuring that every bargain involved a profit for both sides. In other words, they worked on the basis of good service. He then went on to explain the various ways in which the public are safeguarded.

How, asked Mr. Goodenough, could any consumer really know—unless he or she followed the advice the Company had always given consumers to read their meters every week—that the consumption during a quarter was greater or less than in a corresponding quarter? How could a consumer remember four or five months afterwards what the circumstances were that led him to use the gas, or not to use it, at any particular time? How many of those present could tell, off-hand, what the temperature was during the first week in April of this year, as compared with the first week of April the year before? On Saturday, April 1, this year the average temperature was 39°, and on the same day in 1921 it was 53°; and his Company were sending out on that day this year 25 p.ct. more gas than on the same day last year. On immediately succeeding days the conditions were similar, and there were enormous increases in the quantity of gas sent out all through the week. The same thing occurred at other periods of the quarter; but when in July consumers received their bills for the June quarter, they had completely forgotten about these low temperatures in the early part of the period, and said they could not possibly have consumed the quantity of gas which the meter showed they had used. There was also, of course, the effect of the great coal stoppage in 1921 to be considered. This year, for the first time since the war began, consumers had had an unlimited supply of gas.

Dealing with the reason for the change-over to the therm, Mr. Goodenough pointed out that the Board of Trade, and Parliament behind them, decided to introduce the new system, which possessed advantages, once one had got over the difficulties of understanding it, which was the only disadvantage. It was untrue to say that the gas appliances in use to-day were not suited to the gas supplied.

As to the high gas bill agitation, an interesting fact was that from the 555,000 slot-meter consumers his Company had had no complaints with regard to the accounts for the June quarter. These consumers had paid as they went along, and had known what they used. Neither had there been any complaints from the large consumers who used gas for trade purposes.

After answering some questions, Mr. Goodenough was heartily thanked for his address.

TRURO GAS COMPANY.

It was reported by the Directors at the annual meeting of the Company last week that the consumption of gas during the year had increased by about 3 million c.ft., and the annual output had nearly reached that of pre-war years. The cost of coal was considerably less than in the previous year, but the expenditure on repair and maintenance of plant, and the renewal of mains and services, had been very heavy. The balance standing to the credit of the profit and loss account amounted to £3022, which it was proposed to appropriate in the payment of a dividend of 5 p.ct. on the preference stock, and of 4½ p.ct. on the ordinary stock, leaving £1779 to be carried forward. The Company's application for power to charge for gas on a heat unit basis had been approved, and the new standard price fixed by the Board of Trade was 1s. 6d. per therm; but gas was now being supplied at 1s. 5d. per therm.

Mr. JOSEPH ROGERS (who presided, in the absence of the Chairman) said that the charge of 1s. 5d. per therm was equivalent to 6s. 4½d. per 1000 c.ft., which was not heavy under present conditions. During the past year the residual products had realized 25 p.ct. less than in the previous year, but the result of the year's working was regarded as being highly satisfactory. The dividend was an increase of ¾ p.ct. on the year before.

After the report and accounts had been adopted, the appointment of Mr. S. J. Ingram (the Engineer and Manager) as Managing-Director was confirmed. The Chairman remarked that the Directors had adopted this method of showing their high appreciation of Mr. Ingram's services. So far as the shareholders were concerned, it would not make any difference to the finances of the Company. Mr. Ingram said he had been in the service of the Company for 27 years, and valued this mark of appreciation. They were hoping to be able at no distant date to still further reduce the price of gas.

Price and Dividend at Alford.—The Directors of the Alford Gas Company announce a reduction of 4d. per 1000 c.ft. in the price of gas, which will then stand at 7s. 4d. The profit earned during the past year enables a dividend of 2½ p.ct. to be paid.

JUBILEE AT ABERDEEN.

By an inspection of the gas-works early next month, the Aberdeen Town Council are to celebrate the jubilee as a Corporation concern of the gas undertaking, with the development of which Mr. Samuel Milne, the Gas Engineer and Manager (who was appointed to this position 19 years ago) has been closely associated for the past 31 years.

The first Gas Light Company was formed in Aberdeen in 1826, and oil gas, not coal gas, was manufactured by the Company during the first years of their existence. It cost from 40s. to 50s. per 1000 c.ft., and did not pay even at this figure. In 1828 the Company commenced the manufacture of coal gas, and the price was 15s. per 1000 c.ft. But, said Mr. Milne in an address given to the local Rotary Club some time ago, it is recorded that one Middleton Rettie, in the year 1806, lighted his works in Broad Street with coal gas made on the premises. In 1812, James Wright, tinsmith, lighted his shop in Queen Street with coal gas made in a retort placed in an ordinary grate; and he consumed the gas direct from the retort, without any purification.

As early as 1839 there were 48 miles of cast-iron main-pipes, of 2 in. diameter and upwards, distributing gas in Aberdeen, reaching to Woodside and Old Aberdeen. In 1843 a rival Company appeared on the scene, and on Nov. 22 of that year a prospectus was issued to the public, wherein it was proposed to establish a new joint stock company. On Oct. 18, 1844, the new Company announced that their works were in full operation, and that they were supplying the public with "gas-light of the purest quality" at rates ranging from 7s. down to 5s. 6d. per 1000 c.ft., according to consumption, and that service-pipes and meters were to be supplied to all, and kept in repair, without charge. The day following the old Company announced similar terms, which meant a substantial drop of 2s. per 1000 c.ft., as well as free meters and service-pipes. The Companies struggled along for about two years, and then in September, 1846, it was agreed to amalgamate, and dispose of the site and works of the old Company.

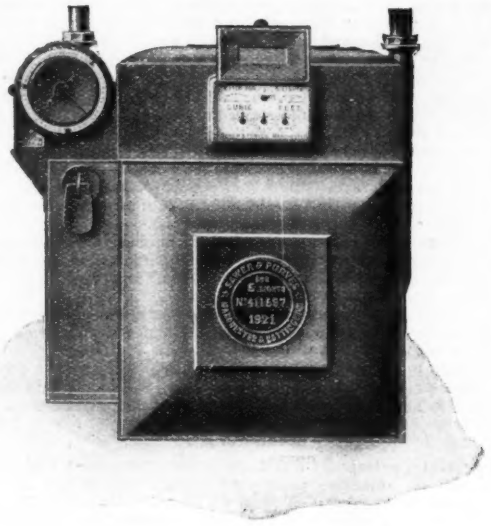
Until 1871 the Gas Light Company of Aberdeen continued to do business and to prosper; but under the Aberdeen Municipality Extension Act of that year powers were taken to acquire the undertaking, and after a parliamentary fight the purchase was effected by a perpetual annual payment or annuity of 5s. on each of the 26,000 shares of the Company, amounting to £6500 a year, and being at the rate of 10 p.ct. per annum on the paid-up capital of the Company. These 26,000 shares, converted to annuities, have been gradually reduced by the operation of the contingent fund. The late Mr. Alexander Smith, appointed by the Company to be their Gas Superintendent in 1866, remained at the head of the concern until 1903, when he was succeeded by Mr. Milne, an Aberdeen man, trained under Mr. Smith.

PROPOSED ASSOCIATION OF BRITISH ENGINEERING SOCIETIES.

It was announced in the "JOURNAL" a fortnight ago that the Council of the Society of Engineers had arranged for a conference of the members of certain engineering organizations to take place at the Engineers' Club, Coventry Street, W., for the purpose of considering and, if thought advisable, inaugurating the formation of the Association of British Engineering Societies, in general accordance with a suggested draft constitution which was set out with the notice calling the meeting. In the notice there was also included a preliminary list of societies who might, it was thought, be invited to join the new Association, and among the number were the Institution of Gas Engineers and the Institution of Heating and Ventilating Engineers. The conference was duly held last Friday afternoon, under the chairmanship of Mr. T. J. Gueritté (President of the Society of Engineers), and the discussion was joined in by many of those attending.

At the outset, the Chairman said he desired to make quite clear to all just what was the rôle of the Society of Engineers in convening the meeting. The part of the Society was merely to give the movement a start. The Society simply wished to throw out suggestions which might form the basis of discussion upon a matter which had deeply interested the Society for a considerable number of years. It was in this spirit that they had prepared a list of organizations which it seemed to them might be invited to join the scheme. Immediately this part had been fulfilled, the Society of Engineers would drop back into the ranks. There had been received so far only two or three letters expressing disapproval of the scheme, and he believed that these had been written under a complete misapprehension of the facts of the case. On the other hand, there had been many letters intimating entire approval of the idea. Once the results of that day's conference became known, many bodies who were for the present keeping aloof would probably come in.

The general scheme was then explained at some length by Mr. W. N. Twelvetrees (Past-President of the Society of Engineers), who was one of the first to promulgate the idea that an Association of British Engineering Societies should be formed. Mr. Twelvetrees said the German engineers were combined in this way, and practically the same thing applied to Austria; while in the United States, also, some of the organizations were united. If a sufficient number of the engineering societies in this country would join together to form an Association something on the lines proposed, a distinct step would have been taken. What the Society of Engineers had in view was a body which was not in any way intended to compete with anything that was being done by the four National Institutions—the Civils, Mechanicals, Electricals, and Naval Architects—who had been discussing matters for some time past, and had now formed a Joint Engineering Council. What the Society of Engineers had in view was that other organizations should combine together to take such steps as might be desirable in the interests of the profession. At present, his own personal feeling was that nothing but good could result from the bringing together of engineering societies all over the country, in order that they might co-operate for professional purposes, that social relations might be



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assisted, and that engineering knowledge might be promoted. The idea was not at first to include all the engineering societies of the country, but a dozen or two, who could form a provisional Council. The exact lines upon which the organization should proceed would be decided by this Council, and then the scheme could be proceeded with so as to bring in more and more societies.

Mr. C. H. Wordingham (Past-President of the Institution of Electrical Engineers, and President of the Junior Institution of Engineers), who was the next speaker, said that he had long advocated combined action among the engineering bodies, so that they might, in the first place, speak with a united voice on engineering questions. The ideal would no doubt be to have a single body to represent the profession, but experience had shown that it was absolutely necessary, owing to the vast field covered, that there should be a division into main specialized institutions. This advantage was, however, necessarily accompanied by the disadvantage of a certain amount of disunion and separation, and therefore dissipation of effort. There was no one body who could speak with a united voice on behalf of all engineers. The constitution set forth in the notice of meeting was not nearly full enough to meet the objects in view; and he suggested that the best way to proceed would be to form a Provisional Committee to draw up a fuller scheme.

This suggestion found acceptance, and it was agreed to appoint a Committee of seven, who will formulate detailed proposals, and submit them to the bodies eligible to join an Association of British Engineering Societies. The names of the members of the Committee, in the order in which they were appointed, are: Mr. N. Wyld, Society of Technical Engineers; Mr. W. N. Twelvetrees, Society of Engineers; Mr. J. H. Blizard, Institute of Sanitary Engineers; Mr. C. H. Wordingham, Institution of Electrical Engineers, and Junior Institution of Engineers; Mr. A. S. E. Ackermann, Society of Engineers; Mr. E. J. Cullis, Gloucester Engineering Society; and Miss C. Haslett, Women's Engineering Society. Mr. Bath Spencer (Technical Inspection Association) was chosen to act in the event of Mr. Wordingham, who had left the meeting before his election, being unable to accept a position on the Committee.

TRADE NOTES.

The Business "Buff Book."

A book that is useful in every commercial office owing to the mass of information it contains is the "Buff Book" Trade and Business Directory for London. A copy of the October edition is before us; and it is seen that, in addition to the previous information it contained—all of which has been brought up to date—there is now included an Hotel Section, which gives the names of all the principal hotels in the British Isles, the Continent, Egypt, &c. (some 6000 hotels in all). A copy of the book is being sent to each one of these hotels, so there will be a very complete and up-to-date London Directory of Traders and the Professional Classes available for travellers almost wherever they go in Europe. Bound in stiff covers, the price is 2s. 6d. each, or by post 3s. 6d. The publishers are the Business Telephone Directories, Ltd., 25, Lawrence Lane, E.C. 2.

Extensions at Prestatyn.—The Prestatyn Urban District Council have decided to obtain a loan for the construction of a new gasholder, a retort-house, and a railway siding into the works.

Kidderminster Gas Company.—At the annual meeting of the Company on Thursday last, Mr. G. W. Grosvenor stated that a profit of £3087 had been made, compared with a loss twelve months ago of £3455. Satisfactory as the result was, it could not make good the accumulated loss during the period when the Government compelled them to sell gas below cost. The Board had hoped that during the present half year they would make sufficient profit to enable them to resume payment of dividends. As a public-utility undertaking they must supply gas at as low a price as possible compatible with a reasonable profit. The report was approved.

Nottingham and the Therm Controversy.—Interest still continues to be centred in Nottingham in the discussion of the therm question, which has given rise locally to somewhat heated controversy. The matter has been taken up by the Chamber of Commerce, whose membership includes most of the largest manufacturers and consumers of gas in the town; and the attitude of this representative body threatened at one time to be antagonistic to the adoption of the therm system. But a report was presented by a committee at the last meeting of the Chamber stating that, as it will be necessary for the Corporation to declare the calorific quality of the gas which it is intended to supply, and having regard to expert advice which the committee had obtained, they were of opinion that there is no need for apprehension upon the part of the consumer, and therefore did not recommend any opposition to the proposed Order being made. This eminently sound conclusion is in complete accordance with all that has been urged by the Gas Committee.

Gas Poisoning at Worksop.—Under circumstances which left doubt as to whether death was the result of suicide or accident, through gas poisoning, the dead body of Mr. Andrew Ritchie Hunter, head of the firm of Messrs. Hunter and Wardell, ironfounders and coachbuilders, of Worksop and Birmingham, was found in the bathroom of his residence at the former town, with the room full of gas. Examination disclosed that the gas union had been disjointed from the geyser, and his head was leaning towards the geyser, from which he would get the full rush of gas. At the inquest, Dr. Kemp suggested that, previously to carrying out his intention to have a bath, deceased might have discovered a leakage of gas, and in moving the nut to remedy the defect turned it the wrong way, being almost immediately overpowered by the fumes. The Coroner said that the circumstances in some respects pointed directly to intentional suicide, but, on the other hand, they were equally strong as indicating accident. He should, therefore, return an open verdict.

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Annual General Meeting.

In moving the adoption, at the meeting last Wednesday, of the report and accounts for the year ended June 30, the Chairman (the Rt. Hon. T. M'Kinnon Wood) said that, in the conducting of any manufacturing or commercial business or enterprise, the year through which they had just passed had been the most difficult and anxious in the memory of the oldest among them. Prices of raw materials have fallen rapidly and heavily. It was, of course, impossible to conduct any manufacturing business without suffering to some degree from this continuous fall; but he thought they might congratulate themselves that they had anticipated the inevitable course of markets, bought raw materials only to the extent necessary to maintain their output, and avoided holding heavy stocks which would have involved serious losses. They shared with others the burden from which all industry was suffering at the present time—the exceedingly high rate of taxation. As to the corporation tax, he thought strong and combined effort should be made to relieve joint-stock enterprise from this unfair burden, which was unjustly differential. It fell upon business enterprise, and not upon other forms of investment, and therefore had a prejudicial effect upon commerce and upon the employment of labour. It fell upon limited liability companies, and not upon other businesses. It fell upon the ordinary shareholders, who took the biggest share of the risks of the venture. In their own Company, it had reduced the dividend on the ordinary shares by 6 p ct.—that was, 6 p.ct. of the dividend. Considering the extraordinarily difficult year, and the large number of companies who had passed their dividends and made serious losses, he thought they had reason to be satisfied with the result. They would have been able to maintain the dividend at the same rate as the last two years, but for one most unfortunate circumstance. At a time when their books were full of orders, the dispute in the engineering trade led to a strike and lock-out, which seriously reduced the output for eleven weeks during the last six months. They were very grateful to their customers who appreciated their difficulties, and none of whom cancelled their orders; but it was inevitable that they should lose many orders which otherwise they would have received. The result had been that they had been obliged to reduce the dividend on the ordinary shares to 6½ p.ct. Otherwise there would have been no difficulty in maintaining the previous rate. Since the labour troubles ended, output had been most satisfactory. Prices during the year had been reduced to customers as the cost of raw materials and rates of wages had fallen. In the stove trade they had had to compete with a large combination, and there had been keen cutting of prices; but they believed they had lost nothing by being independent and concentrating all efforts on their own goods. Their manufactures had improved. With their new silent fires and efficiency cookers they had not only held their own, but had made headway. A new branch of the meter business had recently been opened at Newcastle, and another was now being started in Edinburgh. The increase of duties on their goods in Australia, where in the past they had done a considerable business, had obliged them to take the matter into serious consideration. The Vice-Chairman (Mr. A. P. Main) spent nine months in Australia and New Zealand and initiated new arrangements which were now in course of settlement, and which it was hoped would place the business on a satisfactory basis and lead to new developments in their trade in Australasia. They were much indebted to him for undertaking this work. Since they last met, he regretted that a well-known shareholder, Mr. Thomas Glover, had passed away, after two severe operations. His death in these circumstances in the prime of life was a very sad event. If they were spared further labour troubles, the present outlook was very satisfactory.

The report was adopted, and dividends were declared at the rate of 5 p.ct. on the preference shares and 7 p.ct. for the half year to June (making 6½ p.ct. for the year) on the ordinary shares—both less income-tax.

The Chairman, responding to a vote of thanks to the Directors and staff, remarked that the Company's old reputation in the meter line had been well maintained by Colonel Glover and those who worked with him.

Mr. Main then, in response to an invitation by the meeting, gave an interesting account of the impressions he had gained during his trip round the world.

Mr. Wigley, on behalf of the shareholders, desired that an expression of their deep sympathy be conveyed to the widow and family of the late Mr. Thomas Glover, and this was unanimously agreed to.

Imperial Continental Gas Association Dividend.—The Directors announce their intention shortly to declare, out of the ascertained profits of the half year ended June 30, an interim dividend at 5 p.ct. actual on the £1,976,000 capital stock, payable, less income tax at 5s. 3d. in the pound (the average rate for 1922), on Nov. 15. The Board have decided to revert to their pre-war practice of paying two equal half-yearly dividends.

Torquay Gas Company.—The customary dividends at the rate of 10 and 7 p.ct. per annum were declared at the half-yearly meeting of the Torquay Gas Company last week. Along with this dividend, Major R. P. Kitson, who was in the chair, announced a reduction in the price of gas, as from the reading of the meters for the Michaelmas quarter, equivalent to 9·6d. per 1000 c.ft., bringing the charge to 4s. In addition to the dividend, said the Chairman, the increase in the amount of gas sold (though lower prices had been charged), coupled with a reduction in the coal, oil, labour, and other items, permitted of a small balance being carried forward. The only unsatisfactory feature of the half-year's working was the decreased profit on residuals. In reply to a question as to whether the therm system was disadvantageous to the consumer, Major Kitson said in his opinion the complaints that had been made in the Press and elsewhere were not justified.

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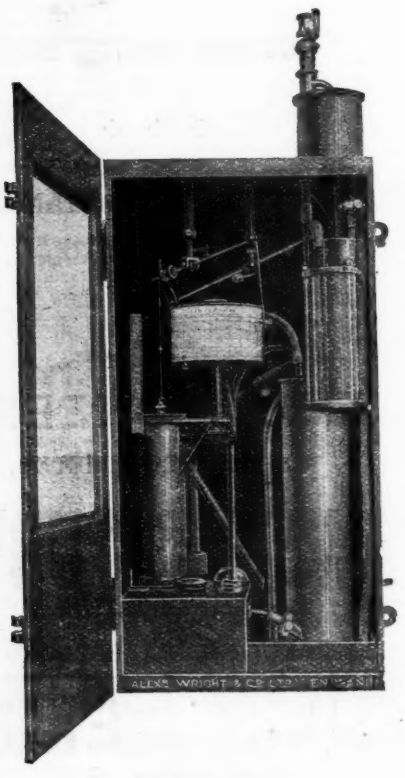

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 3.

The firmness of pitch in the London tar products market remains, and there is now a very fair inquiry for delivery of this material right up to the end of March next. The price is very steady from 90s. to 95s. per ton in bulk at makers' works. The position of creosote is also firm; the price being about 6¾d. to 7d. per gallon in bulk at makers' works. Other products remain unaltered.

Tar Products in the Provinces.

Oct. 2

The average values for gas-works products during last week were: Gas-works coal tar, 52s. 6d. to 57s. 6d. Pitch, East Coast, 92s. 6d. to 95s. f.o.b. West Coast—Manchester, 85s. to 87s. 6d.; Liverpool, 86s. to 89s.; Clyde, 88s. to 90s. Benzole 90 p.ct. North, 1s. 10d. to 1s. 11d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 3d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 10d. to 1s. 11d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9¼d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 6⅛d. to 6⅜d.; salty, 5⅜d. to 5⅝d. Scotland, 4⅝d. to 5d. Heavy oils, in bulk, North, 6¼d. to 6½d. Carbolic acid, 60 p.ct., 2s. to 2s. 1d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

There has not been much improvement in bye-products since I last wrote. Prices are steady. The new American tariff has not had much effect upon our market so far; but it will probably be the means of checking some of the inquiry which has lately been in evidence. The market for pitch is rather stronger, and the latest advices point that still higher prices are likely. The demand for road tar is greater than usual this year; and this will lessen the available quantities of pitch. For this article, 95s. f.o.b. has been paid, and even 97s. 6d. is reported. Not much is being done, however, in Wales. Naphthalenes are steady at about £17 per ton for refined and £4 10s. to £6 for crude, according to quality. Carbolic acid is much firmer; crudes not being very plentiful at 2s. per gallon. Crystals are a much better market at 7d. per lb.; and if this price can be obtained, it is quite likely that makers will offer more for their crudes, which would lead to an increase in the production. Cresylic acid is rather irregular, largely on account of the new tariff in America. The current quotation is from 2s. 4d. to 2s. 6d. per gallon. Naphthalenes are inactive at 1s. 10d. to 2s. per gallon for solvent and 1s. 8d. for heavy. There is not much fresh to report in intermediate products, and business is still within narrow lines. Aniline oil is in small request, mostly on home account, and aniline salts are steady, at the last quoted rates of 1s. 1d. per lb. in each case. Beta naphthol is rather better on more inquiry at 1s. 5d. per lb. Resorcin remains at 5s. per lb., anthracene 40 to 50 p.ct. at 9d. per unit, and salicylic acid is 1s. per lb. for technical grade.

Sulphate of Ammonia.

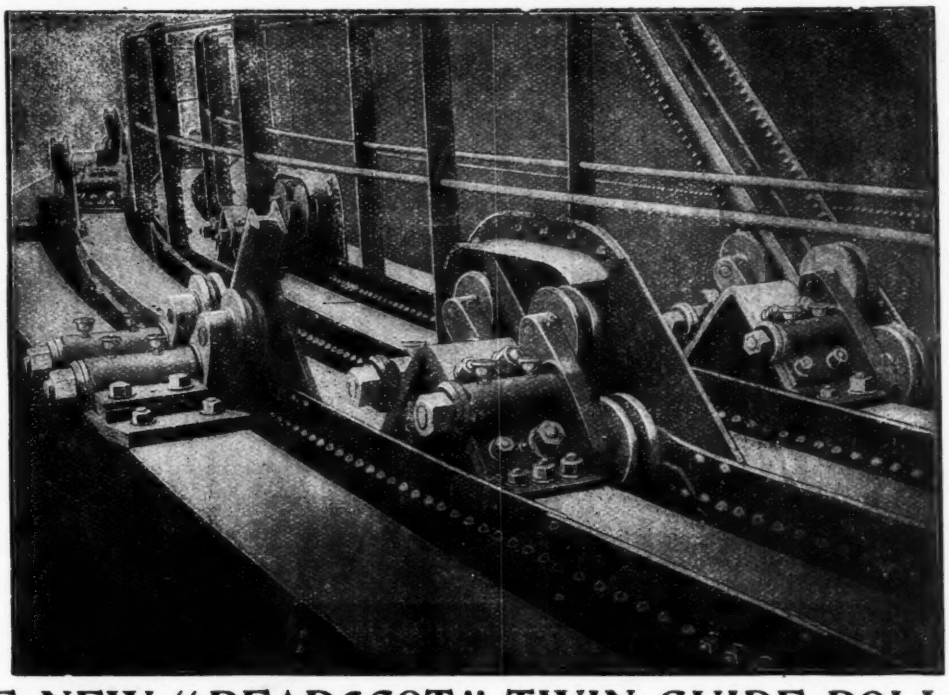
There is nothing fresh to report in sulphate of ammonia. The demand is still fairly extensive, and supplies are scarce. On account of the large quantities which are being sent abroad, there is some difficulty in supplying home needs. It is quite likely that prices will be raised next month, largely on account of the world-wide shortage.

A Reduction at Leamington.—A reduction in price, at the close of the present Michaelmas quarter, is announced by the Leamington Priors Gas Company from 11½d. per therm (corresponding to 4s. 6d. per 1000 c.ft.) to 10d. per therm (equal to 4s. per 1000 c.ft.).

Blackrock Gas Supply.—The Blackrock (co. Dublin) Urban Council passed a resolution asking the Free State Government to institute an inquiry into the quality, pressure, and price of the gas supply provided by the Alliance and Dublin Consumers' Gas Company. The mover calculated that at 1s. 6d. a therm the Company were charging 6s. 9d. per 1000 c.ft. It should be mentioned that the Company now announce a reduction, at December, of 1d. per therm.

Bolton Elective Auditor's Report.—The Elective Auditor for Bolton, in a report on the gas-works, states that there has been a decrease of £22,129 in gross income. An increase of £22,107 in expenditure reduced the gross profit to £35,919, against £81,135 for the previous year. A sum of £25,000 was added to depreciation and renewals fund, but £33,770 was expended, of which £30,874 was for the new vertical retort plant at the Gas Street works. The depreciation and renewals fund now stands at £23,145.

Bradford and the Tong Overseers.—In regard to the dispute between the Bradford Corporation and the two Overseers of the Tong district (both of whom are members of the Corporation), who claim that the Corporation are asking a higher rate from the district than they are entitled to until the price of gas in the Tong rural area (supplied by a private Company) comes down to the Bradford Corporation gas prices, the matter is expected to go to a Court of law for settlement. One of the Overseers has signed the rate levy. The other having refused to sign and gone on the Continent, the Bradford City Treasurer (as Chief Assistant Overseer) has signed in his stead. The test case on which the question of legality will be taken to Court is expected to be between the Corporation and the Birkenshaw Co-operative Society.



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MANCHESTER.

STOCK MARKET REPORT.

The Stock Market has had another troubled week. At the opening on Monday, a good attempt was made to take a brighter view; but it would not stay, and markets dropped very quiet with falling prices. Home Government issues weakened, and Indian were lower. The Railway Market was steady; Home Rails and Argentine maintaining their position.

On Tuesday, apprehension regarding the Near East increased, and creating abstention kept markets very dull. Wednesday was a little calmer; but things fell back again next day, and so to the end of the week great anxiety prevailed. Among the big four, Funding was the weakest. Friday's prices were: Consols 56½-56⅝, War Loan 99⅜-99⅞, Funding 83⅝-84¼, Victory 87¼-88.

The Foreign Market was naturally disturbed.

Business in the Gas Market was a good bit quieter, and was devoid of any incident that was interesting and noteworthy. A pleasing feature, of course, was the fact that, although variations in quotation were very few in number, all but one of them were in the upward direction. In the London Companies, the only move was a rise of 1 in Gas Light ordinary; in Suburban and Provincial, Alliance and Dublin ordinary rose 1, and Brentford "A" and "B" ½ each; but Newcastle was 1 lower. The only other change was a gain of 2 by Imperial Continental.

The following transactions in gas during the week were recorded: On Monday, Bournemouth 5 p.ct. 11⅞, ditto "B" 11½, Brentford "A" 100, 100½, Gas Light ordinary 92⅜, 93, 93¼, 93½, 93¾, 94, ditto maximum 62, ditto preference 79½, Imperial Continental 156, 158⅜, ditto debenture 70, Primitiva preference 37s. 6d., South Metropolitan 93⅛, Tuscan 3s., Hampton Court 5 p.ct. 99½, Malta and Mediterranean 7 p.ct. first preference 70s., ditto 7½ p.ct. second preference 70s., Swansea 7 p.ct. preference 104½. On Tuesday, Bournemouth "B" 11, 11⅛, Gas Light ordinary 93½, 93⅜, 94¼, 94½, ditto preference 80, Imperial Continental 156, 157, 157⅛, 158⅛, 159⅛, Primitiva preference 38s. 9d., River Plate debenture 54, 54⅛, South Metropolitan 93½, 93¾, 94½, Croydon 7½ p.ct. preference 103, Hampton Court 5 p.ct. 100. On Wednesday, Brentford "B" 101½, 102, 102½, Gas Light ordinary 93⅜, 94, 94¼, 94⅜, 94½, 94⅝, 95, Hastings and St. Leonards 3½ p.ct. 75½, Imperial Continental 160, Primitiva 13s. 1½d., 13s. 6d., 14s., South Metropolitan 93¾ 94, 94⅛, 94½, Tottenham debenture 76⅜, Barnet "C" 117, 117⅜, South Suburban 7 p.ct. debenture 101. On Thursday, Brentford "A" 101½, European 10½, 10⅞, Gas Light ordinary 94, 94⅛, 95, 95⅛, ditto maximum 61½, 62⅛, ditto preference 79⅛, Imperial Continental 158, 159, 160, 161, 161½, Liverpool 5 p.ct. 90⅜, South Metropolitan 93⅛, 94⅛, ditto 6½ p.ct, debenture 105⅛, Tottenham debenture 77⅛, Cardiff 7½ p.ct. debenture 105, East Grinstead 7 p.ct. maximum "C" 8 9/16, Great Yarmouth 8½ p.ct. maximum, quarter shares, 8⅜, 8½, Pinner 7 p.ct. "B" 5⅞, Swansea 7 p.ct. preference 103. On Friday, Brentford "B" 102, 102½, Commercial 4 p.ct. 94, ditto 3 p.ct. debenture 56½, 57½, Gas Light ordinary 94, 94⅛, 94⅛, 94½, 94⅝, 94⅜, ditto maximum 61, 62⅜, ditto preference 79, Imperial Continental 156, 156½, 159, 160⅜, South Metropolitan 93⅜, 94⅛, ditto 6½ p.ct. debenture 105, 105⅛, South Suburban 5 p.ct. debenture 99, Broadstairs 7 p.ct. "D" 65⅛, Swansea 7 p.ct. preference 103, Newport (Mon.) 5 p.ct. debenture 85, Colonial Association 5 p.ct. debenture 71½.

In the Money Market, as usual at the close of a quarter, there was a special demand for accommodation; but on this occasion it was more moderate in degree than what would amount to an ordinary average, and thus rates did not rule high. Discount terms were firm and maintained great steadiness throughout the week. Silver scarcely moved, ranging only from 35 5/16 to 35⅜. The Bank of England rate was 3 p.ct., as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
182,049	Stk.	Aug. 24	4	4%	Aldershot 4 p.c. Pref.	..	68—73	...
1,551,868	,,	Apl. 12	2½	3 1/8%	Alliance & Dublin Ord.	59—64	63—68	...
374,000	,,	July 13	4	4%	Do. 4 p.c. Deb.	76—79	60—65	...
280,000	5	May 18	7½	4/-	Bombay, Ltd.	5⅛—6⅛	4¼—5¼	...
100,000	5	Aug. 10	16	7½%	Bournemouth Gas and Water: 5 p.c.	..	11—12	11⅞
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	10⅜—11⅛	11—11⅛
115,000	10	,,	6	6%	Bournemouth Gas and Water: Pref. 6 p.c.	13½—14	8—9	...
162,065	—	June 29	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	73—78	...
992,045	Stk.	July 27	14	6⅓/-	Brentford A Consolid.	261—266	98—103	100—101½
734,920	,,	,,	11	6⅓/3	Do. B New	204—209	98—103	101½—102½
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	82—87	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	75—80	...
214,775	,,	Aug. 24	11	11⅛%	Brighto & Hove Orig.	208—213	165—170	...
244,200	,,	,,	8	8⅛%	Do. A Ord. Stk.	154—159	120—125	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	...
530,000	20	Mch. 15	12½	10%	British	44—45	31—33	...
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58	...
100,000	10	June 1	—	7%	Cape Town & Dis., Ltd.	1½—2½	6¼—7¼	...
100,000	10	Apl. 27	—	4⅛%	Do. 4½ p.c. Pref.	4—6	6¼—7¼	...
100,000	Stk.	June 29	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	73—78	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	93—98	91
560,000	,,	,,	5⅛	55/-	Do. 3½ p.c. do.	103—105	93—98	...
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	55—60	56¼—57½
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	27—34	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—60	...
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.c.	..	..	...
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	..	..	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	80	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	65	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17½—18	10½—11⅛	10½—10⅞
16,298,975	Stk.	July 27	4/17/4	52/-	Gas Light and Coke: 4 p.c. Ord	98—102	93—95	92½—95⅜
2,600,000	,,	,,	3½	35/-	Gas Light and Coke: 3½ p.c. max.	76—79	61—64	61—62½
4,062,235	,,	,,	4	4%	Gas Light and Coke: 4 p.c. Con. Pref.	96—99	79—82	79—80
4,674,850	,,	June 15	3	3%	Gas Light and Coke: 3 p.c. Con. Deb.	72½—74½	61—64	...
130,000	,,	Dec. 11	10	10%	Gas Light and Coke: 10 p.c. Bonds	..	..	...
82,500	,,	Sept. 21	5	65/7½	Hastings & St. L. 5 p.c.	..	95—100*	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	75—78*	75½
70,000	10	May 18	11	7½%	Hongkong & China, Ltd.	16½—16⅝	6—7	...
86,600	Stk.	Aug. 24	9	9%	Hornsey 7 p.c.	..	127—132	...
131,000	,,	Aug. 10	7½	7½%	Ilford A and C	151—154	..	...
65,780	,,	,,	6½	5⅛%	Do. B.	115—118	..	...
65,500	,,	June 29	4	4%	Do. 4 p.c. Deb.	92—94	..	...
1,976,000	,,	May 18	9	10%	Imperial Continental	150—160	157—162	156—161½
404,800	,,	Aug. 10	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	70—75	70
235,242	,,	July 27	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.: A.	211—213	..	90⅜
					Liverpool 5 p.c. Ord.: B.	146—148	..	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	...
165,736	,	Aug. 10	7/5/6	87/3	Maidstone 5 p.c.	..	87—92	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb.	..	54—59	...
75,000	5	,,	6	6%	Malta & Mediterranean Met. of Melbourne 4½ p.c. Deb.	99—101	91—98	...
250,000	100	Apl. 3	4½	4½%	Monte Video, Ltd.	11½—12	62—67	...
541,920	Stk.	June 1	4	4%	Newcastle & Gatsh'dCon.	98½—99½	77—79	...
1,875,892	,,	July 27	4½	4½%	Do. 3½ p.c. Deb.	82—83	67—6⅞	...
529,705	,,	June 29	3½	3½%	North Middlesex 10 p.c.	..	12⅜—13	...
15,000	10	Aug. 26	—	7/6	,, ,, 7 p.c.	14—15	10½—11½	...
55,940	10	Aug. 24	7/14/0	7/8⅜	Oriental, Ltd.	117—122	92—97	...
300,000	Stk.	May 18	8	8%	Ottoman, Ltd.	7¼—7⅝	2—3	...
60,000	5	—	10	—	Plym'th & Stonh'se 5 p.c.	..	93—98	...
188,120	Stk.	June 29	—	6/3/9%	Portsea Island, B	128—131	100—105	...
60,000	50	Aug. 24	13	65/-	Do. C	118—121	85—90	...
100,000	50	,,	12	60/-	Primitiva Ord.	5¼—6	⅛—⅞	13/1½—14/-
249,980	5	—	8	—	Do. 5 p.c. Pref.	4½—5	1¼—2½	37/6—38/9
499,960	5	—	5	—	Do. 4 p.c. Deb.	91—93	68—73	...
521,600	100	June 1	4	4%	Do. ,, ,, 1911	..	55—60	...
600,000	Stk.	July 27	4	4%	River Plate 4 p.c. Deb.	85—87	53—58	54—54½
346,198	,,	June 29	4	4%	San Paulo: 6 p.c. Pref.	10½—11	5½—6*	...
150,000	10	Sept. 21	6	6/-	San Paulo: 5 p.c. Deb.	47—49	35—38	...
125,000	50	July 3	5	5%	Sheffield A	223—224	95—97	...
135,000	Stk.	Aug. 24	10	5%	Do. B	222—224	91—97	...
209,984	,,	,,	10	5%	Do. C	220—222	95—97	...
523,500	,,	,,	10	5%	Shrewsbury 5 p.c.	..	..	...
133,201	Stk.	Sept. 15	4	4%	South African	10½—11½	7—9	...
90,000	10	June 29	9	7½%	South Met. Ord.	111—113	93—96	93½—94½
6,609,895	Stk.	July 27	5/4/0	5%	Do. Red. Pref.	..	94—96	...
250,000	,,	July 13	—	5%	Do. 3 p.c. Deb.	72½—74½	61—64	...
1,895,445	,,	,,	3	3%	South Shields Con. Stk.	157—159	106—108	...
224,820	,,	Aug. 24	8½	8½%	S'th Suburb'n Ord. 5 p.c.	114—116	97—100	...
1,087,795	,,	,,	6	6%	Do. 5 p.c. Deb. Stk.	116—118	95—100	99
368,837	,,	June 15	5	5%	Southampton Ord.	99—102	75—80	...
647,740	,,	May 18	5	5%	Do. 4 p.c. Deb. Stk.	..	63—68	...
121,275	,,	June 29	4	4%	Tottenham District: A 5 p.c.	135—138	110—115	...
120,000	,,	July 27	—	7½%	Tottenham District: B 3½ p.c.	115—117	97—102	...
782,275	,,	,,	6	6%	Tottenham District: 4 p.c. Deb.	87—89	75—80	76½—77½
181,255	,,	June 15	4	4%	Tuscan, Ltd.	5—6	⅛—⅜	3/-
182,380	10	Dec. 30	5	—	Do. 5 p.c. Deb. Red.	93—95	20—30	...
149,900	10	July 1	5	5%	Tynemouth 5 p.c. max.	108½—109	73—75	...
236,476	Stk.	Aug. 24	5	2½%	Wandsworth, Wimbledon, and Epsom—			
					Wandsworth A 5 p.c.	151—156	111—115	...
30,000	,,	July 27	8½	72/6	Do. B 3½ p.c.	129—134	95—100	...
255,636	,,	,,	6½	57/6	Do. C.	..	85—90	...
108,075	,,	,,	—	50/9	New Ordinary	..	85—90	...
140,865	,,	,,	—	50/9	Wimbledon 5 p.c.	117—122	95—100	...
352,000	,,	,,	6½	53/9	Epsom 5 p.c.	121—126	95—100	...
98,000	,,	,,	6½	58/9	3 p.c Deb. Stk.	66—69	57—60	...
88,416	,,	June 29	3	3%				

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ACCIDENTS ON GAS-WORKS.

With a view to emphasizing the fact that a comparatively low accident rate can be secured on gas-works by careful operation and standardized practice, a paper was submitted by Mr. F. W. Fisher, Employment and Safety Manager of the Rochester (N.Y.) Gas and Electric Corporation, at this year's convention of the Canadian Gas Association. There were also set out some causes of accidents and fires, with methods of combating them.

The author said that, in considering the accident and fire hazards in gas properties, it is important to correct the erroneous, though common, impression that gas-works operation is particularly hazardous; for experience shows that gas and electric properties of about the same size, and operated with approximately the same relative efficiency, have practically the same accident cost. This cost, in the Company which Mr. Fisher represents, has averaged for the past five years about 0·6 of 1 p.ct. of the gross earnings in each department. It is true that possibilities of serious accident, catastrophe, or conflagration do exist in gas properties to a greater degree than in the majority of business or manufacturing enterprises; but these possibilities are well recognized, and have been brought under a very high degree of control, with a corresponding reduction of the probabilities of human injury and financial loss. It is generally agreed that the most effective method of reducing accidents in industrial establishments is through a safety organization; and the operation of a safety organization in a gas-works, in particular, is for several reasons easier than in many other enterprises. The general organization is composed of a comparatively small number of men, who usually work for the same or slightly larger wages than those prevailing elsewhere for a similar class of work, while the occupation in which they are engaged is comparatively permanent. Public utility operators as a class are good business men, who know how to get results. These factors, among others, ensure a somewhat higher type of employee. Accident prevention work is conducted upon a business basis, and consequently a safety organization is considerably more stable and efficient than the average.

The form of safety organizations for gas companies of which the author most approves is different from that generally recognized by industry, principally because the work of gas companies is highly specialized and technical. The system is intended to localize responsibility, to avoid the error of over-organization, to utilize the best talent available, and to omit detail which adds unnecessarily to expense or which may be neglected as the system goes on. It consists of a General Safety Committee made up of the executive superintendents of the company, with subordinate Inspection Committees composed of assistant superintendents, engineers, foremen, master mechanics, and men of superior ability from the ranks. The General Committee have charge of all safety work and meet monthly, while the Inspection Committees look over all company property quarterly in rotation. This form of safety committee, properly administered, puts the responsibility for accidents where it belongs—on the operating officials.

Accident costs must be regularly prepared. Gas-works operating superintendents in particular (upon whom the safety supervisor is dependent for the discipline necessary to make safety work effective) are much interested in costs. What is believed to be one of the best statistical tabulations to interest these officials, and show clearly how accident work is progressing, is one which equalizes costs for comparative purposes by taking into account the various degrees of hazards throughout the plant concerned. To make-up these statistics, the actual cost of accidents for each department is ascertained monthly on a cumulative basis, using the figures for money actually expended, *plus* reserves set aside on uncompleted cases. These costs are divided by the departmental pay-roll, thus establishing a pure premium. The latter is then divided by the insurance rate for the department, which is the best practical measure of the risks of the work, with the result that the premium for each department is equalized and is comparable. Theoretically these adjusted premiums should all be equal, and their variation gives, figuratively speaking, "a yard stick with which to measure the efficiency of individual departments." The cost of accidents per 1000 c.ft. of gas produced gives a further comparison which is very useful. A monthly report of this nature stimulates real work, and a more careful analysis of accidents.

As a protest against the new charges for gas, the people of Winslow (Bucks) have decided to dispense with street lighting during the winter.

The Directors of the Bombay Gas Company have decided to pay an interim dividend at the rate of 8 p.ct. per annum, less income-tax, for the half year ended June 30. It is payable on Nov. 1.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 27.]

Nos. 25,142 to 25,805.

AGUILLON, J. E.—"Recovering benzole contained in gas." No. 25,377.

BATT, C.—"Gas-burners." No. 25,155.

BLAIR, A., and BLAIR, CAMPBELL, & MCLEAN, LTD.—"Concentrating liquors to high densities." No. 25,421.

BOARDMAN, E. E.—"Gas-heater for water, &c." No. 25,379.

BOVING, J. O.—"Valves for regulating flow of fluids in pipes, &c." Nos. 25,562, 25,563.

BREISIG, A.—"Gasifying bituminous fuel." No. 25,378.

DORMAN & CO., LTD., W. H.—"Pipe-joints." No. 25,701.

EVANS, E. V.—"Manufacture of smokeless fuel." No. 25,231.

GRAEFE, P.—"Apparatus for separating liquids from compressed air, gas, or vapour currents." No. 25,322.

HEESCH, O. K.—Automatic gas-meter." No. 25,685.

HELPS, G.—"Gas-burners." Nos. 25,793, 25,794.

MADSEN, M. O. S.—See Heesch, O. K. No. 25,685.

MONGER, A. L.—"Device for control and regulation of bore of tubes, pipes, or cylinders for gases, liquids, &c." No. 25,243.

NEATH, E.—"Manufacture of gas from coal and oil." No. 25,790.

NOBLE, E. & T. K.—"Incandescent gas-burners." No. 25,716.

SHAW, H. S. HELE-.—"Valves." Nos. 25,700, 25,799.

SOUTH METROPOLITAN GAS COMPANY.—See Evans, E. V. No. 25,231.

STEED, O. G. H.—See Dorman and Co., Ltd., W. H. No. 25,701.

SWYNNERTON, F. R.—"Gas cooking-ranges." No. 25,688.

WILLIAMS, G. A.—"Governors for gas-lamps." No. 25,692.

WILSON, J.—"Device for supporting gas-mantles." No. 25,166.

Loss at Darwen.—The annual statement of the Borough Treasurer shows that there was a loss on the Darwen Corporation gas undertaking for the past year of £4338, which compares with a loss of £4263 for the previous year.

Additional Discount at Redcar.—It was announced at a meeting of the Redcar Urban Council last week that an additional 5 p.ct. discount off gas accounts would take effect from the beginning of the October quarter. The total discount is thus 15 p.ct., and in effect this means a reduction in price to 5s. 2½d. per 1000 c.ft. Within a comparatively short period, the charge has been lowered by more than 1s. per 1000 c.ft.

Reduction in Price at Worthing.—Intimation has been made by the Worthing Gas Light and Coke Company of a reduction in the price of gas, as from the reading of the meters for the Michaelmas quarter, of 0·4d. per therm, making the charge to ordinary consumers 14d. per therm and to those taking gas through prepayment meters 16½d. per therm. The concession is equal to 1·88d. per 1000 c.ft., and with the previous reduction operating from the June readings represents a saving to the customers of close on £5000 per annum.

British Industries Fair (Birmingham).—The fourth British Industries Fair (Birmingham) will take place from Feb. 19 to March 2, 1923, and will again be housed in the permanent buildings at Castle Bromwich Aerodrome. This place is eminently suitable for the purpose, and it is hoped by the opening date to have all the buildings connected and self-contained. It will then form the largest exhibition hall in the country. Ample transport accommodation is available, inasmuch as the site adjoins Castle Bromwich Station on the Midland Railway, and has its own sidings alongside the buildings in which the Fair will be held.

Trade Union Clauses in Contracts.—The Southwark Borough Council have decided to appeal to the Ministry of Health against a surcharge of fifteen members of the Rating Committee for refusing to consider a tender in which the fair wages or trade union clause had been struck out by the firm tendering. They accepted the next highest tender, which in six months involved an extra expenditure of £294. The District Auditor (Mr. Carson Roberts) held that the Council should have been informed that they were not recommended to accept the lowest tender, and that by inserting in their tender form a clause that trade union wages and conditions only must be observed was against public policy and detrimental to the best interests of the ratepayers. The Rating Committee came to the conclusion that the surcharge had been improperly imposed, seeing that the Committee acted *bonâ fide* in rejecting the alleged tender, and in accordance with the Standing Orders of the Council. The Finance Committee supported this contention, adding that in their opinion the Rating Committee did that which the Council required them to do, and consequently, if the Committee performed a wrongful action, the Council, and not members of the Rating Committee, should be held responsible.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

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